

**MULTIFACETED RESEARCH
IN ARCHITECTURE**



Editor Beata Komar

VOLUME I

ARCHITECTURE AND HEALTH
in the face of today's challenges
and as a source of inspiration for
the development of attitudes
towards disability and old age

Editors Iwona Benek
Anna Szewczenko



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Editors
Iwona Benek
Anna Szewczenko

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Iwona BENEK¹, Anna SZEWCZENKO²

INTRODUCTION

The holistic vision of public health formulated by its precursor C.E.A. Winslow refers primarily to health promotion activities: "*Public health is the science and art of preventing disease, prolonging life, and promoting physical health and fitness through the organized efforts of society to hygienize the environment, to combat community-acquired infections, to educate individuals about the principles of personal hygiene, to organize medical and nursing services aimed at early diagnosis and preventively directed treatment, and to develop social mechanisms that will ensure for each individual in society a standard of living adequate to maintain health*³". This definition was the basis for the public health programmes and strategies adopted by the experts of the World Health Organization.

In the field of architecture and urban planning, these are issues that have been addressed for many years, mainly from the perspective of quality of life in cities or the shaping of quality in the living environment. However, nowadays public health and quality of life take on a new meaning by combining the value of health with the concept of sustainable development or an approach focused on users' preferences and needs and the assumption of equal rights to health. Therefore, contemporary challenges require solutions that simultaneously ensure the inclusion of stakeholder groups and make use of the latest scientific findings. Architecture in this context can become an integral component of the healing process or of building the well-being of users, as confirmed by numerous studies in the field of environmental psychology or the rapidly developing neuroarchitecture. It is against this background of research into the impact of the built environment on the psycho-physical condition of users

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³ C-E.A. Winslow. The untilled fields of public health. *Science*, 1920, vol. 51 (1306); 23-33.

that the concept of the healing environment has developed. What lies at the basis of this concept, i.e. the influence of the physical characteristics of space on human functioning, can be related in a certain sense to the holistic concept of health. It uses elements of the natural environment and optimum sensory stimulation as factors for alleviating environmental stress, which is a strong stimulus disturbing human equilibrium. This concept plays an important role especially in relation to healthcare objects.

Furthermore, an important component of building public health among the population is physical activity and contact with the outdoors, which has a direct impact on our well-being and psycho-physical condition. Promoting physical activity is included in the WHO European Healthy Cities Network⁴. Importantly, health in this programme is framed in terms of a process that is an effort to improve health-promoting conditions and extend community resources to enable all residents to be physically active and thereby participate in community life. Most member cities have recognised active living as an overriding value in spatial planning and thus as a factor of social cohesion. Among other things, measures have been taken to promote walking and cycling. This concerns not only the creation of appropriate infrastructure, but also the attractiveness of pedestrian spaces and the availability of basic services in the place of residence. In this context it is also worth to recall the concept of Active Design, which for over 10 years has been promoted and implemented by the authorities of New York. It uses a range of solutions that motivate local communities to be physically active by creating places for active recreation in public spaces, planning multifunctional urban areas and promoting active mobility. The concept also includes solutions in buildings that emphasise the attractiveness of pedestrian movement, such as locating open, well-lit staircases connected to resting areas overlooking active recreation spaces. Synergy with the concept of sustainable development and universal design as a measure of the accessibility of implemented spatial solutions and services is important.

Social cohesion is an important dimension of building public health also at the level of spatial changes. This applies in particular to actions aimed at improving the health of groups of people with special needs: people with disabilities or the elderly. All actions aimed at increasing accessibility, taking the concept of universal design as

⁴ Edwards P., Tsouros A.D.: A healthy city is an active city: a physical activity planning guide. WHO, Copenhagen 2008.

a paradigm in design activities, should be distinguished here. Concern for public health is one of the main priorities of European governments. The growing number of elderly people and people with reduced mobility, together with the deepening crisis in the health service, forces us to review many solutions in the area of social policy, urban planning and architecture. It also motivates us to look for new possibilities of supporting these groups through preventive, educational and therapeutic measures. The initiative of research and undertakings in this area receives considerable interest from researchers in various disciplines.

The demands of contemporary senior citizenship policy are related to the recognition of older people as a group involved in the life of intergenerational urban communities. This is how the World Health Organisation defines the concept of an age-friendly city⁵. It is also important to mention the significant role that modern technologies play in shaping inclusive urban solutions. This perspective on the role of older people in society has also been adopted in the concept of "smart ageing", defined as "using technology, innovation and design in both the public and private sectors to produce products, services, solutions and systems to improve quality of life", including assisted living⁶. An analysis of the literature on the development of ICT technologies to assist older people allows several main areas of activity to be identified: integrating role of ICT technologies in social participation, enhancing social capital and Inclusive Smart City, accessibility of forms of health, social care and urban services and promoting independence in housing environment⁷.

Creating accessibility has many dimensions. Recent national experiences in this aspect include the implementation of the Act for the Ensuring Accessibility for Persons with Special Needs⁸, which in the areas of transport, health, education, and services drives architectural accessibility measures aimed at creating an environment without barriers and discrimination in which people with disabilities fully participate in social and work life. In this context it is worth to mention that public spaces play an important role in the environmental, economic and social context of a city, as well as shaping the quality of life. The variety of solutions to ensure free and independent

⁵ World Health Organization. Global age-friendly cities: A guide. World Health Organization, 2007.

⁶ Fico G., Montalva J., Medrano A., Liappas N., Mata-Díaz A., Cea G. Arredondo M.T.: Co-creating with consumers and stakeholders to understand the benefit of Internet of Things in Smart Living Environments for Ageing Well. *Data & Knowledge Engineering*, 115, 2018, pp. 68-79.

⁷ Szewczenko A.: The concept of smart city in terms of improving the quality and accessibility of urban space for the elderly; literature review, *ACEE Archit. Civ. Eng. Environ.*, 2020 vol. 13, nr 2, s. 27-35.

⁸ Ustawa z dnia 19 lipca 2019 r. o zapewnianiu dostępności osobom ze szczególnymi potrzebami (Dz. U. 2019 poz. 1696).

use and the multifunctionality of the space are the basic dimensions of accessibility. This is primarily about the accessibility of forms of travel and the promotion of pedestrian movement. In addition, the quality of public space is also an effect of social participation in the planning and management of this space. In this respect the cities are now looking for more effective tools to involve the inhabitants and thus to achieve solutions which meet the specific needs of the inhabitants. This theme appears among others in the activities of intelligent cities, creating a new dimension of accessibility by means of technological tools. It is also worth mentioning the role of ICT in creating accessibility of public spaces and buildings - the active role of older people in this aspect is not only an important source of knowledge about spatial barriers (i.e. exploring mobile crowdsourcing of older citizens' opinions on their neighbourhood to support decision-making process of planning urban environments⁹), but also providing users with information about the possibilities of moving around and using urban functions (such as AXS Map, Access earth, AccessNow, Wheelmap applications).

In addition, new themes are emerging in research on the accessibility of public spaces, which broaden the scope to include the attractiveness of pedestrian spaces as an area for social interaction and meaningful functions¹⁰. Some of these new themes emerged as a result of experiences during the pandemic period, in which some of the previous paradigms were revised. This includes reflections on forms of using public spaces. Therefore, this publication is a reflection on the pandemic period as a time of new challenges and an indication of the potential of the built environment in creating healthy conditions for users.

There is a need for flexible solutions in contemporary architecture, which is a result of changing needs from time to time: the pandemic period verified solutions in health care facilities which were no longer viable as they were not adapted to the new demand. Moreover, it was a time of reviewing existing paradigms and developing changes in design. This includes hospital facilities, where the architecture forms a significant framework for the treatment process. We are not only talking about medical technology solutions that ensure the efficiency of the treatment process and patient safety. This includes the ability to maintain contact with loved

⁹ Thorne, J., Li, A., Sivaraman, V., Bridge, C.: Mobile Crowdsourcing Older People' s Opinions to Enhance Liveability in Regional City Centres. [in:] Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), 2014 IEEE Ninth International Conference on, IEEE (2014), 1-7.

ones and the organisation of social spaces in hospital spaces. A systems approach to creating an efficient and safe hospital environment takes into account:

- user safety strategy (patient flows and treatment organisation),
- creation of graphic health standards for visual information
- implementation of changes in building regulations and design recommendations (creation of spatial conditions allowing for reduction of infection emission).

It is also about the psychological comfort of patients, isolated from the outside world, and the search for spatial solutions enabling the restoration of homeostasis in this situation.

All of the above asperities of the health effects of the built environment are covered in the chapters of this publication. This publication explores the relationship between architecture, technology, and health and presents the results of scientific and design work, whose authors are asking how urban spaces (urbanistic issues), buildings (architectural issues), and technological solutions can address challenges posed by social and health issues. Are medical and social care facilities able to deal with the new needs and challenges?

The first chapter highlights the potential hidden in architectural history and physical culture. This interdisciplinary approach encourages looking at the space of a historic city as a multidimensional device for psycho-physical exercise. Targeted walks in the historic part of the city combined with activation of the senses as well as with appropriately selected movement and educational form can contribute to the improvement of health, well-being and consequently the quality of life of many user groups. The presented research can also change the perception of historical architecture and encourage both architects and designers to reinterpret selected building elements and architectural details.

The second chapter is devoted to the description of the criteria for assessing the quality of social spaces in geriatric hospitals and long-term care facilities with regard to the needs of patients with dementia. As can be seen from world literature on the design of hospital facilities and other forms of long-term care, significant changes in the design of hospital buildings occurred in the second half of the 20th century with the evaluation of knowledge about the needs of users of this type of space. The criteria presented here are part of a tool developed to check the functional and

¹⁰ Talavera-Garcia R.: Improving Pedestrian Accessibility to Public Space Through Space Syntax Analysis. [in:] Eighth International Space Syntax Symposium Santiago, PUC, 2012.

behavioural quality of these healthcare facilities in terms of the needs of patients with dementia. The tool was developed together with students of the Faculty of Architecture at the Silesian University of Technology as part of their participation in the programme "Initiative of Excellence - Research University" at the Silesian University of Technology in Gliwice.

Emphasising the role of social spaces is of particular importance, especially in view of the reduction of such spaces in the functional programmes of facilities and the need to implement appropriate solutions to prevent social isolation of patients in times of the pandemic. In this paper, a comparative analysis of available qualitative assessment tools was used to identify the most relevant spatial quality categories in healthcare facilities.

The aim of the next chapter is to present the solutions developed as part of the interdisciplinary cooperation during the Individual Study Programmes conducted in the form of Project Based Learning (PBL) at the Silesian University of Technology in 2021. The problem of cognitive disorders is a growing phenomenon not only amongst the elderly, and spatial solutions are a recognized factor that can support the quality of patient care and their functioning. The main goal of the authors was to design a graphic information system for the space in which a person with dementia resides and to test the solutions in an application for mobile VR glasses. The application for mobile VR glasses, presenting the world from the perspective of people 60+ provides the possibility of testing further proposals related to the design for the elderly in virtual space. It is also possible to run the application with the simulations of older people's conditions disabled so that the application could be used by the elderly. The research has made it possible to organize the materials related to the principles of designing a graphic information system for people with dementia and to test the mobile VR glasses for simulating medical conditions of older people in private and public spaces. The analysis focused on various graphic techniques supporting the orientation of an elderly person with dementia and methods of testing them in virtual space on mobile devices. The final result of the research and implementation work undertaken is the design of signs and labels to be used in a flat or a long-term care facility.

The publication also draws attention to the need to implement the processes of adapting the public spaces of spas and sanatoriums, as well as residential structures for the elderly to their needs, so that in the future seniors can function freely and

safely while maintaining their autonomy. In the second half of the last century, an important activity of the scientific and research process was the introduction of a new form of treatment in the form of post-hospital and specialist rehabilitation. Preventive activities aiming to counteract and prevent the onset and development of diseases began to play an important role in sanatorium and spa treatments. In the last, fifth chapter the authors present two examples of expanding an existing health resort to include autonomous residential complexes providing safe interdisciplinary activities for seniors as well as pilot cluster solutions with therapeutic treatments based on the concept of a "new health resort"- designed and built based on a modern, ecological RES system, as a response to the shift and extension of the age of human physical activity, determining the introduction of new strategies for the development of architecture for the elderly.

To sum up, the aim of this publication is to identify new design challenges for urban spaces as well as medical and social care buildings, which in the face of statutory changes in Poland, demographic changes and pandemic challenges may need to be transformed. The broad approach to the subject of the relationship between architecture and health in this publication is certainly an invitation to further interdisciplinary research and an aid to architectural and urban planning in creating healthy environments.

In today's world we have no shortage of current challenges to which architecture should respond: the climate crisis, social inequalities, and finally - or perhaps most importantly - man himself, the user with his baggage of experiences, increasingly lost in the modern world. It is undeniable that we have been given the opportunity to work and design in an age of architecture that is socially sensitive and universal for people with varying degrees of sensitivity, and recent experiences have intensified the desire to seek in architecture what protects us and helps us to develop. Good architecture, good city, good architect - listens. And it is this important skill that is worth developing in today's world. Do we develop this skill as designers? As researchers, do we have effective tools to do so? Do we teach it to our students?

We leave the readers of this publication with these reflections, encouraging them to read it.

Iwona BENEK¹¹, Anna SZEWCZENKO¹²

WPROWADZENIE

Holistyczna wizja zdrowia publicznego sformułowana przez jej prekursora C.E.A. Winslowa odnosi się przede wszystkim do działań promujących zdrowie: *Zdrowie publiczne to nauka i sztuka zapobiegania chorobom, wydłużania życia oraz promowania zdrowia fizycznego i sprawności poprzez zorganizowane wysiłki społeczeństwa mające na celu higienizację środowiska, zwalczanie zakażeń występujących w społecznościach, edukację jednostek odnośnie zasad higieny osobistej, organizację świadczeń lekarskich i pielęgniarstwa mających na celu wczesną diagnozę oraz profilaktycznie ukierunkowane leczenie oraz rozwój mechanizmów społecznych, które zapewnią każdej jednostce w społeczeństwie standard życia właściwy dla utrzymania zdrowia*¹³. Definicja ta była podstawą przyjętych przez ekspertów Światowej Organizacji Zdrowia programów i strategii na rzecz zdrowia publicznego.

W obszarze architektury i urbanistyki są to zagadnienia podejmowane od wielu lat, głównie z perspektywy jakości życia w miastach lub kształtowania środowiska zamieszkania. Jednak współcześnie zdrowie publiczne i jakość życia nabierają nowego znaczenia dzięki łączeniu wartości, jaką jest zdrowie, z pojęciem zrównoważonego rozwoju czy podejściu skoncentrowanym na preferencjach i potrzebach użytkowników oraz przyjętemu założeniu równości praw do zdrowia. Dlatego współczesne wyzwania wymagają rozwiązań, które równolegle zapewniają włączenie grup interesariuszy oraz korzystają z najnowszych wyników badań naukowych. Architektura w tym kontekście może stać się nieodłącznym komponentem procesu leczenia lub budowania dobrostanu użytkowników, co potwierdzają liczne badania

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z zakresu psychologii środowiskowej czy też rozwijającej się dynamicznie neuroarchitektury. Na tym podłożu badań wpływu środowiska zbudowanego na kondycję psychofizyczną użytkowników rozwinęła się koncepcja środowiska terapeutycznego (ang. *healing environment*). To, co leży u podstaw tej koncepcji, czyli wpływ cech fizycznych przestrzeni na funkcjonowanie człowieka, odnieść można w pewnym sensie do holistycznej koncepcji zdrowia. Wykorzystuje ona elementy środowiska przyrodniczego i optymalną stymulację sensoryczną jako czynniki łagodzące stres środowiskowy, będący silnym bodźcem zaburzającym równowagę człowieka. Koncepcja ta odgrywa ważną rolę zwłaszcza w odniesieniu do obiektów opieki zdrowotnej.

Ponadto ważnymi komponentami budowania zdrowia publicznego wśród społeczeństwa są aktywność fizyczna i kontakt ze środowiskiem zewnętrznym, mające bezpośredni wpływ na nasze samopoczucie i kondycję psychofizyczną. Promowanie aktywności fizycznej zostało ujęte w ramach sieci Zdrowych Miast (WHO European Healthy Cities Network¹⁴). Co istotne – zdrowie w tym programie jest ujęte w kategoriach procesu, który jest dążeniem do poprawy warunków prozdrowotnych i poszerzenia zasobów społeczności lokalnej, aby umożliwić wszystkim mieszkańcom aktywność fizyczną i tym samym uczestniczenie w życiu społecznym. Większość miast członkowskich uznała aktywne życie za nadrzędną wartość w planowaniu przestrzennym, a tym samym za czynnik spójności społecznej. Podjęte zostały między innymi działania mające na celu promowanie chodzenia pieszo i jazdy na rowerze. Dotyczy to nie tylko tworzenia odpowiedniej infrastruktury, lecz także atrakcyjności przestrzeni pieszych i dostępności podstawowych usług w miejscu zamieszkania. Warto w tym kontekście przywołać również koncepcję Active Design, którą od przeszło 10 lat promują i wdrażają władze Nowego Jorku. Wykorzystuje ona wiele rozwiązań, które motywują społeczności lokalne do aktywności fizycznej przez tworzenie miejsc aktywnego wypoczynku w przestrzeniach publicznych, planowanie wielofunkcyjnych terenów miejskich i promowanie aktywnej mobilności. Pojawiają się w tej koncepcji także rozwiązania w budynkach, które akcentują atrakcyjność ruchu pieszego, np. lokalizowanie otwartych, dobrze doświetlonych klatek schodowych połączonych z miejscami do wypoczynku, z widokiem na przestrzeń aktywnej rekreacji. Istotna jest przy tym synergia z koncepcją zrównoważonego rozwoju

¹³ Winslow C.E.A., The untilled fields of public health. *Science*, Vol. 51 (1306) 1920, pp. 23-33.

¹⁴ Edwards P., Tsouros A.D.: A healthy city is an active city: a physical activity planning guide. WHO, Copenhagen 2008.

i z projektowaniem uniwersalnym jako miarą dostępności wdrażanych rozwiązań przestrzennych i usług.

Spójność społeczna jest ważnym wymiarem budowania zdrowia publicznego również w płaszczyźnie zmian przestrzennych. Dotyczy to w sposób szczególny działań ukierunkowanych na podniesienie poziomu zdrowia grup osób ze szczególnymi potrzebami: osób z niepełnosprawnością czy osób starszych. Wyróżnić tu należy wszelkie działania na rzecz zwiększenia dostępności, przyjmujących koncepcję projektowania uniwersalnego za paradygmat w działaniach projektowych. Troska o zdrowie publiczne jest jednym z głównych priorytetów europejskich rządów. Rosnąca liczba osób starszych czy osób o obniżonej sprawności ruchowej wraz z pogłębiającym się kryzysem służby zdrowia zmuszają do weryfikacji wielu rozwiązań tak w obszarze polityki społecznej, jak i urbanistyki czy architektury. Motywują też do szukania nowych możliwości wsparcia wspomnianych grup przez działania profilaktyczne, edukacyjne i terapeutyczne. Inicjatywa badań i przedsięwzięć w tym zakresie otrzymuje niemałe zainteresowanie badaczy różnych dyscyplin.

Postulaty współczesnej polityki senioralnej związane są z uznaniem osób starszych za grupę zaangażowaną w życie międzypokoleniowych społeczności miejskich. W takim ujęciu definiowana jest koncepcja miasta przyjaznego starzeniu Światowej Organizacji Zdrowia¹⁵. Należy tu także wspomnieć o niebagatelnej funkcji, jaką nowoczesne technologie pełnią w kształtowaniu inkluzywnych rozwiązań miejskich. Ta perspektywa w spojrzeniu na rolę osób starszych w społeczeństwie została przyjęta także w koncepcji „smart ageing”, definiowanego jako „wykorzystywanie technologii, innowacji i wzornictwa do wytwarzania produktów, usług, rozwiązań i systemów poprawiających jakość życia, w sektorze publicznym i prywatnym”, między innymi w zakresie mieszkań wspomaganych¹⁶. Analiza literatury w zakresie rozwoju technologii ICT wspomagających osoby starsze pozwala wyróżnić kilka głównych obszarów działań: integrująca rola technologii ICT w partycypacji społecznej (zapobieganie wykluczeniu), wzmacnianie kapitału społecznego i tworzenie inkluzywnego miasta inteligentnego, dostępność form opieki zdrowotnej, społecznej oraz usług miejskich, a także promowanie niezależności w środowisku mieszkaniowym¹⁷. Warto tu także wspomnieć o roli technologii ICT w tworzeniu

¹⁵ World Health Organization. Global age-friendly cities: A guide. World Health Organization, 2007.

¹⁶ Fico G., Montalva J., Medrano A., Liappas N., Mata-Díaz A., Cea G. Arredondo M.T.: Co-creating with consumers and stakeholders to understand the benefit of Internet of Things in Smart Living Environments for Ageing Well. *Data & Knowledge Engineering*, 115, 2018, pp. 68-79.

¹⁷ Szewczenko A.: The concept of smart city in terms of improving the quality and accessibility of urban space for the elderly; literature review, *ACEE Archit. Civ. Eng. Environ.*, Vol. 13, No. 2, 2020, pp. 27-35.

dostępności przestrzeni i budynków użyteczności publicznej – aktywna rola osób starszych w tym aspekcie jest nie tylko ważnym źródłem wiedzy na temat barier przestrzennych (m.in. badanie opinii starszych mieszkańców za pomocą mobilnego crowdsourcingu w celu wsparcia procesu podejmowania decyzji dotyczących planowania zmian w środowisku zamieszkania¹⁸), lecz także wiąże się z dostarczaniem użytkownikom informacji na temat możliwości przemieszczania się i korzystania z funkcji miejskich (jak np. aplikacje AXS Map, Access earth, AccessNow, Wheelmap).

Tworzenie dostępności ma wiele wymiarów. Na polu najnowszych doświadczeń krajowych w tym aspekcie wdrażane są zapisy Ustawy o zapewnianiu dostępności osobom ze szczególnymi potrzebami¹⁹, która w obszarach transportu, zdrowia, edukacji czy usług napędza działania związane z dostępnością architektoniczną, mające na celu stworzenie środowiska bez barier i dyskryminacji, w którym osoby z niepełnosprawnościami w pełni uczestniczą w życiu społecznym i zawodowym. Z drugiej strony we współczesnej architekturze istnieje potrzeba tworzenia elastycznych rozwiązań, co wynika ze zmieniających się okresowo potrzeb: okres pandemii zweryfikował rozwiązania w obiektach ochrony zdrowia, które przestały być wydolne jako nieprzystosowane do nowego zapotrzebowania. Mowa tu nie tylko o rozwiązaniach w zakresie technologii medycznej, zapewniających sprawność procesu leczenia i bezpieczeństwo pacjentów. Chodzi również o komfort psychiczny pacjentów, wyizolowanych od świata zewnętrznego, o poszukiwanie rozwiązań przestrzennych umożliwiających przywrócić w tej sytuacji homeostazy.

Wszystkie powyższe aspekty zdrowotnego oddziaływania środowiska zbudowanego zostały ujęte w rozdziałach niniejszej publikacji. Jej tematyka obejmuje relacje pomiędzy architekturą, technologią a zdrowiem i przedstawia rezultaty naukowych i projektowych dokonań, których autorzy zastanawiają się, w jaki sposób przestrzenie miejskie (zagadnienia urbanistyczne), budynki (zagadnienia architektoniczne) i rozwiązania technologiczne mogą realizować wyzwania społeczno-zdrowotne. Czy obiekty opieki medycznej i społecznej odpowiadają na nowe potrzeby i wyzwania?

W pierwszym z rozdziałów podkreślono potencjał ukryty w historii architektury i kulturze fizycznej. Takie interdyscyplinarne podejście zachęca do spojrzenia na przestrzeń historycznego miasta jako na wielowymiarowe urządzenie do ćwiczeń

¹⁸ Thorne J., Li A., Sivaraman, V., Bridge C.: Mobile Crowdsourcing Older People's Opinions to Enhance Liveability in Regional City Centres [in:] Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), 2014 IEEE Ninth International Conference on, IEEE (2014), pp. 1-7.

¹⁹ Ustawa z dnia 19 lipca 2019 r. o zapewnianiu dostępności osobom ze szczególnymi potrzebami (Dz.U. 2019 r. poz. 1696).

psychofizycznych. Ukierunkowane spacerowanie po zabytkowej części miasta połączone z aktywacją zmysłów, odpowiednio dobranym ruchem i formą edukacyjną mogą się przyczynić do poprawy zdrowia, samopoczucia, a w konsekwencji jakości życia wielu grup użytkowników. Przedstawione badania mogą także zmienić postrzeganie architektury historycznej i zachęcić środowiska architektoniczno-projektowe do reinterpretacji wybranych elementów budowlanych i detali architektonicznych.

Drugi rozdział poświęcono opisowi kryteriów oceny jakości przestrzeni społecznych w szpitalach geriatrycznych i w placówkach opieki długoterminowej pod kątem potrzeb chorych z zespołem otępiennym. Jak wynika z przeglądu literatury światowej dotyczącej projektowania obiektów szpitalnych czy innych form opieki długoterminowej, istotne zmiany w kształtowaniu budynku szpitalnego nastąpiły w drugiej połowie XX w. wraz z ewaluacją wiedzy na temat potrzeb użytkowników tego typu przestrzeni. Prezentowane kryteria są częścią opracowanego narzędzia sprawdzającego jakość funkcjonalną i behawioralną obiektów opieki zdrowotnej w aspekcie potrzeb pacjentów z zespołem otępiennym. Narzędzie zostało opracowane wspólnie ze studentami Wydziału Architektury Politechniki Śląskiej w ramach udziału w programie „Inicjatywa Doskonałości – Uczelnia Badawcza” na Politechnice Śląskiej w Gliwicach.

Podkreślenie roli przestrzeni społecznych ma szczególne znaczenie, zwłaszcza z uwagi na redukcję tego typu pomieszczeń w programach funkcjonalnych obiektów oraz z uwagi na potrzebę wdrożenia odpowiednich rozwiązań zapobiegających izolacji społecznej pacjentów w dobie zagrożenia pandemicznego. W pracy zastosowano analizę porównawczą dostępnych narzędzi ocen jakościowych, która pozwoliła na wskazanie najistotniejszych kategorii jakości przestrzennych w obiektach opieki zdrowotnej.

Celem kolejnego rozdziału jest prezentacja rozwiązań wypracowanych w ramach interdyscyplinarnej współpracy podczas Indywidualnych Programów Studiów realizowanych w formie Project Based Learning (PBL) na Politechnice Śląskiej w roku 2021. Problem zaburzeń poznawczych jest narastającym zjawiskiem nie tylko wśród osób starszych, a rozwiązania przestrzenne są uznanym czynnikiem mogącym wspierać jakość opieki nad chorymi i ich funkcjonowanie. Głównym założeniem autorów było zaprojektowanie systemu informacji graficznej dla przestrzeni, w której przebywa osoba z demencją, oraz przetestowanie rozwiązań w aplikacji na mobilne okulary VR. Aplikacja ta, prezentująca świat z perspektywy osób 60+, daje możliwość testowania kolejnych propozycji związanych z projektowaniem dla osób starszych

w wirtualnej przestrzeni. Możliwe jest także uruchomienie aplikacji z wyłączonymi symulacjami schorzeń osób starszych w celu użycia jej przez osoby starsze. Badania pozwoliły na uporządkowanie materiałów dotyczących zasad projektowania systemu informacji graficznej dla osób z demencją oraz przetestowanie mobilnych okularów VR do symulacji schorzeń osób starszych w przestrzeni prywatnej i publicznej. Analizie zostały poddane różne techniki graficzne wspomagające orientację osoby starszej z zespołem otępiennym oraz metody ich testowania w wirtualnej przestrzeni na urządzeniach mobilnych. Efektem podjętych badań i prac implementacyjnych jest projekt oznaczeń i etykiet przeznaczonych dla przestrzeni mieszkania czy też ośrodka opieki długoterminowej.

W czwartym rozdziale przedstawiono wyniki badań przeprowadzonych na próbie 2000 młodych respondentów w zakresie ich potrzeb mieszkaniowych, w tym ich oczekiwań co do miejsca zamieszkania, formy zamieszkania i wielkości przestrzeni życiowej. Przyjęta metodyka prezentacji wyników zmiennych ilościowych obejmowała takie miary statystyczne jak średnia arytmetyczna, odchylenie standardowe czy wielkość, natomiast zmienne ilościowe zostały przedstawione w postaci ilościowej i procentowej. Analizy porównawcze sporządzone na podstawie danych pokazują tendencje w preferencjach mieszkaniowych młodych ludzi zarówno w krótkiej, jak i długiej perspektywie czasowej. Badania miały na celu zdiagnozowanie potrzeb mieszkaniowych młodych ludzi oraz zestawienie ich oczekiwań z tendencjami. W ten sposób studia mogą skutecznie pomóc architektom w tworzeniu rozwiązań, które właściwie odpowiadają faktycznym potrzebom mieszkańców, a także poprawiają jakość projektowanych mieszkań dla przyszłych mieszkańców, ponieważ architekci będą mogli lepiej odpowiadać na potrzeby przyszłych seniorów.

W publikacji zwrócono również uwagę na konieczność wdrażania procesów dostosowania przestrzeni publicznych uzdrowisk oraz sanatoriów, jak również struktur zamieszkania osób starszych do ich potrzeb tak, aby seniorzy w przyszłości mogli funkcjonować swobodnie i bezpiecznie z zachowaniem swojej autonomii. W drugiej połowie ubiegłego wieku istotnym działaniem procesu naukowego i badawczego było wprowadzenie nowej formy leczenia w postaci rehabilitacji poszpitalnej i specjalistycznej. Istotną rolę w lecznictwie sanatoryjno-uzdrowiskowym zaczęła odgrywać działalność profilaktyczna mająca przeciwdziałać i zapobiegać powstawaniu i rozwojowi chorób. W ostatnim, piątym rozdziale autorzy przedstawiają dwa przykłady rozwoju istniejącego uzdrowiska o autonomiczne zespoły zamieszkania oraz bezpiecznej aktywności interdyscyplinarnej seniorów, a także pilotażowe rozwiązania

klastrowe z zabiegami leczniczymi na podstawie koncepcji dla nowego uzdrowiska – projektowane i zbudowane przy wykorzystaniu nowoczesnego, ekologicznego systemu OZE jako odpowiedź na przesunięcie i wydłużenie wieku aktywności fizycznej człowieka, determinujące wprowadzenie nowych strategii rozwoju architektury dla osób starszych.

Podsumowując, celem niniejszej publikacji jest zidentyfikowanie nowych wyzwań projektowych wobec przestrzeni miejskich, ale także budynków opieki medycznej i społecznej, które w obliczu zmian ustawowych w Polsce, zmian demograficznych oraz wyzwań pandemicznych być może powinny ulec przekształceniu. Szerokie ujęcie tematyki relacji architektura – zdrowie w niniejszej publikacji jest z pewnością zaproszeniem do dalszych interdyscyplinarnych poszukiwań oraz pomocą w architektoniczno-urbanistycznym tworzeniu zdrowego otoczenia. We współczesnym świecie nie brakuje nam aktualnych wyzwań, na które architektura powinna reagować: kryzys klimatyczny, nierówności społeczne, a w końcu – a może raczej przede wszystkim – sam człowiek, użytkownik z jego bagażem doświadczeń, coraz częściej zagubiony we współczesnym świecie. Niezaprzeczalnie dane nam jest pracować i projektować w epoce architektury wrażliwej społecznie i uniwersalnej dla osób z różnym stopniem wrażliwości, a ostatnie doświadczenia nasilają pragnienie, aby poszukiwać w architekturze tego, co nas chroni i pomaga się rozwijać. Dobra architektura, dobre miasto, dobry architekt – **słucha**. I właśnie tę ważną umiejętność warto rozwijać we współczesnym świecie. Czy rozwijamy tę umiejętność jako projektanci? Czy jako badacze mamy ku temu skuteczne narzędzia? Czy uczymy tego naszych studentów?

Z tą refleksją zostawiamy Czytelników niniejszej publikacji, zachęcając do jej lektury.

Natalia BURSIEWICZ²⁰

Chapter 1.

PUBLIC SPACE FOR HEALTH – ALTERNATIVE FORMS OF USE AND CREATIVE DIRECTIONS OF DEVELOPMENT

1. INTRODUCTION. HEALING PROPERTIES OF URBAN SPACE

For many decades, discussions about cities in the context of health have focused on providing adequate sunlight and fresh air, waste disposal, clean water, and gardens [14]. The focus was also on health care infrastructure [24]. With time, the healing potential of the city's public spaces has also begun to receive attention. Green areas (parks, squares, promenades, gardens), squares and so-called 'blue spaces' gained interest [15]. Soon projects for model solutions of public spaces appeared, the aim of which was not only aesthetics, but also improving the quality of life of their users. Consequently, active design, which encouraged healthier choices and physical activity, started to increase in popularity. All this was in line with the idea of a Healthy City promoted by the WHO, which emphasises the need for health-conscious urban planning [6]. The analysis of these concepts and implementations, although interesting, will not be addressed in this article. Neither does the potential of urban green and blue spaces [25]. For the idea is to look at the grey zone, i.e. those areas of the city that are not usually associated with 'therapeutic landscapes'. These include numerous squares and streets which are an integral part of the old town and at the same time the primary space in which the elderly function [27]. Taking into account the small number of publicly accessible recreational and sports infrastructure in the area, the difficulty for modification of the existing space, as well as the growing number of elderly people [28] it seems reasonable to look for ideas, which would enable at least partial solution of the above mentioned problems. One of them may be a creative use of available cultural heritage assets. Treating the city as a highly

diverse preventive and therapeutic space may also contribute to corrective and remedial measures and facilitate healthy ageing.

Considering the actual health problems and challenges of our society, the growing popularity of Healing walks and studies in this area is of no surprise. Jody Rosenblatt Naderi, a specialist in landscape architecture and preventive medicine, has dedicated much attention to the subject of health-promoting walks [13]. Another scholar, Patrycja Haupt from the Faculty of Architecture at the Cracow University of Technology, is the author of model concepts of urban motor-sensory paths [16]. Natalia Bursiewicz and Anna Penkała, in turn, propose paths integrating physical culture with history and cultural heritage as an alternative form of urban tourism [4]. The uniqueness of a historic city's public space comes from the presence of diverse, often historic architecture. This in turn may have a positive impact on the user. Evidence of this is provided by research carried out by British public organisations such as Historic England and English Heritage, which shows that visiting historic cities, ancient places of worship or even archaeological sites has the same beneficial effect on wellbeing as social sporting activity [7]. The term heritage healing was even coined to refer to historic sites that contribute to well-being [29]. Typically, studies addressing this issue have focused on the following research areas: activity in museums, visits to museums and historic properties, contact with small-scale historic items in healthcare institutions, volunteering activities in historic properties, revitalisation of the historic area of a city/building, or the relationship between the historic environment, place identity and social capital [18]. Although much research has already been carried out on the impact of heritage in its broadest sense on health and wellbeing, Sarah Reilly, Claire Nolan and Linda Monckton emphasise that further investigations are needed to better understand exactly which landscape or building elements have this effect [21]. An indisputable contribution to the understanding of the effects of architectural forms on the human psyche is "Cognitive Architecture: Designing for How We Respond to the Built Environment" by Ann Sussman and Justin Hollander. We can conclude from it that the historical cities with their so characteristic repertoire of changing landscapes, diverse stimuli, forms, details and textures enrich human perception. The uniformity of buildings, urban monotony extinguish our sensitivity and disorientate us [23]. A similar message comes out of Charles Montgomery's book "Happy City: Transforming Our Lives Through Urban

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Design". For it turns out that people are happier in a kind of visual mess and above all in a **diverse space** [17].

2. PHYSICAL ACTIVITY AND WELL-BEING IN THE PUBLIC SPACE OF A HISTORIC CITY

Public space is an indispensable setting for our everyday life. It is a link where we stay, move, stop, rest and meet. Its diversity as well as its open, generally accessible character are conducive not only to the realisation of the communicational, commercial, entertainment or informational function, but also to the healing one. At the same time, public space constitutes an important sphere of cultural life, which, however, is usually limited to the main square or the largest squares. Meanwhile, the presence of historic buildings as well as elements of small architecture almost everywhere in the old town allows it to expand much further. The integration of visual and physical culture creates additional opportunities that might go beyond the available preventive-therapeutic-educational offerings in public spaces.

The current offer providing opportunities for encouraging physical activity in the city's public spaces focuses on the following areas:

- Strengthening workout – public exercise equipment located in recreational areas (outdoor gyms)
- Aerobic workout – designated running, cycling and walking routes.
- Strength and agility training – climbing (climbing in historic city spaces is not a popular solution, although there is growing interest in adapting the façades of buildings for this function, for example Kletterzentrum Flakturm, Vienna)
- Stretching and relaxation exercises – yoga, tai-chi in the park.

Most of the mentioned forms of exercise are practiced by young, able-bodied people. For they require appropriate motor and fitness preparation. People who are elderly or have reduced mobility most often use outdoor exercise equipment. They are also the group which chooses walking as the most frequent and safest form of exercise.

3. HEALING POTENTIAL OF PUBLIC SPACE COMBINED WITH HISTORIC ARCHITECTURE

The diversity and colourfulness of the streets of vibrant inner cities is considered to be almost the most perfect embodiment of urban space, standing in stark contrast to the sterile homogeneity of the suburbs [12]. The area of the old city is a collage of styles, materials, scales and dimensions. It is abundant in plastic experiences. It is as Cullen describes it as a journey, continuous sequences of open and closed spaces, tensions and stresses [5, p. 10]. Old architecture, for its part, is rich in surprising perspectives and clearances – underlines Herbert [9]. Above all, however, it is characterised by **complexity**, which manifests itself in the composition, details, solidity, texture, colour or even the sequence of views. This quality, on the other hand, stimulates the human brain [26]. Uniformity kills us, whereas consent to diversity revive us, as Cullen emphasizes [5, p.12]. Complex patterns that require attention and concentration have a proven healing effect [22]. Therefore, historical architecture, which is an integral part of most European cities, can be employed in the prevention of health problems and the treatment of certain ailments.

The **beauty** of old architecture is also not without significance. Although beauty belongs to subjective notions, there are certain criteria whose fulfilment determines the positive perception of a building. These usually include charm (eurythmy), appropriate arrangement of elements, ornamentation, decorativeness, legibility, as well as order and harmony [1]. It should also be noted that urban dwellers are acquainted with historical architecture. Daily contact with buildings of different epochs makes users accustomed to them and more likely to judge them in terms of beauty. Their **durability** as well as nobility make them pleasant to look at [19]. Research shows that beautiful architecture has just an equal beneficial effect on our health and psyche as greenery [30]. The key here is the concept of **picture squenceess**, which should not necessarily be limited to the natural landscape, but can also include the urban setting. Simon Bell also confirms that any architecture that evokes a sense of beauty and serenity leads to an affirmation of health [3].

Another strength advantage of the historic city is the **grouping** in a small area, of **a large number of objects**. This in turn, as Gordon Cullen points out, is capable of guaranteeing people a strong kind of visual experience, which is difficult to achieve with a single building [5, p.7]. Equally strong emotional reactions are evoked in the

users by the centuries-old layers, contrasts and dramatic juxtapositions so characteristic of old cities, which intrigue and encourage further exploration of what is around the corner [5, p.9].

Historic towns and cities are used all year round, although being in a public space and actively using it is limited to periods with good weather, so for Poland this will be the spring and summer months and part of the autumn. The intensity of traffic in public spaces decreases in the afternoon hours and on weekends. This means that historic cities in the morning hours have a great potential for being used by older people and women with small children. Field observations to determine the intensity and nature of public space use in the historic city indicate that a large proportion of older people and young mothers move around the city alone. However, when asked about their preference, they emphasise that they would rather go for a walk, exercise or sightseeing in the company of others.

A historic city consists of a variety of objects, not only historic or contemporary architecture, but also urban furniture, artistic and recreational sculptures and specialised equipment. This in turn contributes to its multilayered character. The complex character of urban space creates many possibilities for its creative use, but on the other hand it provokes certain limitations. A big obstacle is mental blockades. For centuries a distance to a large part of the historical city has been ingrained in us. We treat it as a work of art that can be looked at, few people actually understand it, and even fewer "touch" it. The city is largely for viewing, and only in selected spaces is interaction with the object allowed.

The proposed project aims to contribute to changes in perception of the historic fabric of the city and public space. It is also intended to encourage users to experience the city through their different senses.

4. HERITAGE HEALING PATHS – THE IDEA

Healing paths using the tangible cultural heritage in the historical city area assume the exploitation of the potentials especially in the selected building façades visible from the streets and squares. Their creative interpretation provides direct inspiration for designing motor and mental tasks. The analysis of buildings with a view to create a visual vademecum containing a collection of exercises, however, requires interdisciplinary collaboration. The insights of an art historian, an architect,

a rehabilitator and a physical culture specialist enable a multidimensional study of the potential of individual objects and give rise to alternative forms for their interpretation and use.

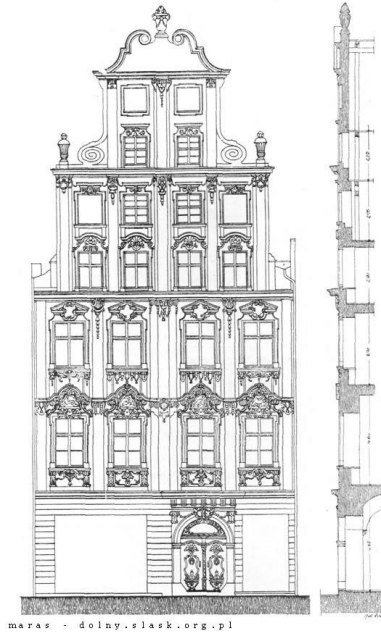


Fig. 1.1. Wrocław. Tenement house (Kamienica) no 18 ("Apteka pod Ratuszem"). Drawing of the front elevation

Source: A Das Bürgerhaus in Schlesien Dr. Ludwig Burgmeister, Verlag der "Deutschen Bauzeitung" G.m.b.H., Berlin 1921. Źródło: <https://polska-org.pl/812763,foto.html>

Heritage Healing Paths are designed for people in late adulthood or with reduced mobility. They can take the form of walks with an appropriately trained guide/mentor and/or be designed as an app for individual use at any time. The expected length of such a walk is around 1 - 3 km.

Below are some examples of propositions of movement and thinking tasks (psychomotor) tasks developed on the basis of one selected tenement house located in the southern frontage of Wrocław Market Square.



Fig. 1.2. Wrocław. Tenement house (Kamienica) no 18 ("Apteka pod Ratuszem"). Photograph of the front elevation

Source: A Das Bürgerhaus in Schlesien Dr. Ludwig Burgmeister, Verlag der "Deutschen Bauzeitung" G.m.b.H., Berlin 1921. Źródło: fot. N. Bursiewicz

- Contact with the object should begin with initial familiarisation with it, understood as getting the observer acquainted with the main architectural divisions and terminology facilitating the proper performance of exercises in the next step (multimedia instruction/guide). Attentive observation combined with identification of elements is at the same time the first mental task. In this case we can familiarise the viewer with the division of the building into three storeys, draw attention to the four-axial character of the façade, vertical divisions introduced by rhythmical pilasters. We can also mention that the ground floor had a commercial function, while the second and third floors had a residential one. Point out the gable part decorated with volutes and a central vase.

- Another task, still an element of familiarisation and an exercise to improve memory and concentration, could be to count the number of floors, the windows on each floor, and then add up all the windows.
- Other preparatory tasks might include: recognising and identifying colours, linking them to specific details; finding and counting the vases; trying to recognise images of male and female faces; trying to remember a selected element, closing one's eyes and then recreating its details in memory, etc.

The Table 1 below presents specific movement tasks:

Table 1

Varios types of movement tasks developed on the basis of tenement house located in the southern frontage of Wrocław Market Square

Stimulation of the spinal cord by the optic nerve	<ul style="list-style-type: none"> • Stand at a distance from the façade, in the central area. Use your eyeballs to see the whole object with your head still. Scan the whole façade from its first storey to the crowning vase.
Breathing exercise combined with visualisation and stretching	<ul style="list-style-type: none"> • Stand approximately 10-15 m from the façade of the building, in the middle of the building. Look at the first window on the left, on the first floor. Inhale through your nose while imagining the movement of opening the window using two hands. Exhale softly through your nose while imagining the closing of the window. Repeat with the remaining windows at this level (3 more breaths). • Look a little higher, at the second row of windows. Starting from the window on the right, inhale while moving your arms in imitation of opening the window. Then exhale with a motion that imitates closing the window. Repeat this exercise three times for each window in this row, moving your gaze to the left. • Look in the direction of the second floor. Place your hands on your hips and then, inhaling slowly through your nose, raise your arms forward overhead while moving your gaze towards the crowning vase. Move your gaze gradually downwards over the entire façade, lowering your arms slowly while exhaling slowly through your nose.
Stretching and coordination exercise	<ul style="list-style-type: none"> • Position yourself with your back to the elevation. Perform a torso twist to the right side while inhaling and stopping your gaze on the outer pilaster. Then return to the starting position while exhaling.

	Then, turn your torso to the left with a simultaneous inhalation and stopping your gaze on the outer pilaster.
Postural exercise	<ul style="list-style-type: none"> Stand with your feet hip-width apart in front of a decorative portal. Place your feet parallel to each other. Pull your abdomen in. Relax your arms and lower your shoulders. Keep your head in an upright position stretched slightly upwards. Imagine that your spine extends with each window up to the attic. During the exercise, take a long, steady inhalation and exhale when returning to the relaxed position.
Exercise for stretching the lumbar spine	<ul style="list-style-type: none"> Facing the decorative portal, raise your arms to shoulder height. Then lower your trunk forward to the limit of your comfort, keeping your eyes on number 18 at the top of the portal. Then lower your arms and lift your torso up.
Exercise for stretching the sides of the trunk	<ul style="list-style-type: none"> Standing facing the decorative portal, raise your right arm sideways upwards while tilting your torso to the left and leading your gaze along the curve of the portal. Inhale while doing this. Then return to the standing position with an exhalation. Repeat the exercise tilting to the right and lifting your left arm.
Strengthening exercise	<ul style="list-style-type: none"> Stand facing the left side of the façade at the height of the left, outer window of the first storey. Place your hands on your hips. Perform a half squat and return to a standing position. Then, move your gaze to the right, to the next window, and take a step sideways to the right. Standing exactly between the pilasters, facing the second window, again perform a half squat. Repeat for the remaining windows in this row.

The movement tasks can be enriched by the history of the object. It is also possible to invent movement tasks between the designated objects using different surface textures, benches, sculptures, monuments, etc. It is also possible to invent movement tasks between the designated objects using different surface textures, benches, sculptures, monuments, etc.

The photos above illustrate the possibility of using different surfaces for forms of therapy through touch. Distinguishing between the different materials of which the city was built, paying attention to their texture, temperature, shape, not only activates the sympathetic nervous system, but also provokes mental training,

reconstructing in one's mind the appearance of a given object, but also thinking about its history, role in the city.



Fig. 1.3. The hand in the background of individual fragments of the façade
Source: Photo: N. Bursiewicz, 2021



Fig. 1.4. Rehabilitation therapist Piotr Bursiewicz performing exercises inspired by an arcade, column, sculpture
Source: Photo: N. Bursiewicz, 2021

It is not only the façades of townhouses that can be used for a health-promoting trail. Small architectural elements, sculptures, retail, art in public spaces are also useful. Each of these can be transformed into an exercise device and each can inspire a specific movement or mental task. As the brain learns through experience, the

proposed pathway assumes a varied form of psychophysical tasks in direct contact with an object, an object, an area. The architecture of the city, both its historical and contemporary components, mobilizes all the senses, enhances cognitive functions and encourages social and physical activities. Therefore, the proposed solution is the creation of a model for using urban space in a conscious way, while at the same time training in cognitive and general development training.

5. HERITAGE HEALING PATHS – IMPACT ON HEALTH AND WELL-BEING

Pro-health, targeted walks combined with psycho-physical exercises using historic architecture can have a number of positive effects. Numerous studies confirm the beneficial effects of **walking** on health, specifically lowering systolic and diastolic blood pressure, reducing heart rate, decreasing body fat, body mass index and total cholesterol [8]. Proximity to a place that encourages walking can also contribute to the length and quality of our lives, as well as maintaining physical fitness for longer [2]. Specially created walking paths for health are becoming increasingly popular in the United States, and the website of the Walking for Health project provides research confirming the positive effects of regular walking on health [32]. However, to ensure adequate physical and mental fitness, the amount of time spent on **physical activity** should be maximised with age. Yet its levels among older people remain below the required minimum of 150 min per week of aerobic, strengthening and coordination exercises [11].

The Heritage Healing Paths idea involves an element of play. The setting of the historic city provides ample scope for this. The very form of the path allows for discovery, it intrigues, encourages noticing, comparing, juxtaposing, recreational forms of movement, all of which are components of entertainment. The proposed idea corresponds to the vision of Aleksandra Prokopska and Anna Martyka, according to whom "in the next decades urban play may become an important strategy contributing to sustainable urban development. People will be inspired to spend time in attractive public spaces so that they will consume less electricity. They will also be encouraged to be more physically active, to have a healthy lifestyle, or to move around the city on foot or by bicycle" [20].

A positive influence on the well-being of older people comes from **social interactions**. It has been shown that even superficial contacts, such as greeting

someone, saying hello or sharing a bench with someone, can have a positive impact on one's well-being [26]. Elderly people, often isolated from the outer world as well as people with health problems can through these interactions and meetings raise their mood, build up a support group, exchange and share experiences. Situations that foster meetings counteract loneliness, and both social relationships and communing with nature have a healing effect.

One of the significant problems faced by elderly people in the city are disorders of spatial orientation. Through the proposed walks, individual buildings can be transformed into distinctive landmarks to facilitate **mental mapping** and movement around the city.

6. CONCLUSION

The ageing process is often associated with numerous ailments, as well as a gradual decline in physical and mental abilities, which makes everyday life more challenging. According to Eurostat methodology, among 60-year-olds $\frac{1}{3}$ are disabled, among 70-year-olds it is more than half, and more than $\frac{3}{4}$ of people in the 80+ group are disabled [31]. According to Eurostat methodology, among 60-year-olds $\frac{1}{3}$ are impaired, among 70-year-olds it is more than half, and more than $\frac{3}{4}$ of people in the 80+ group are disabled [35]. These statistics and numerous reports on the psycho-physical condition of seniors provoke reflection. They also motivate to devise solutions that can be implemented quickly and with the least possible financial outlay. Heritage Healing Paths belong to such solutions. The concept of the health path described in this article can help to improve the well-being, health and fitness of residents in many communities. The city with its incredibly diverse and complex architectural and spatial structure is an ideal platform for pro-health activities. However, it is not an obvious space. The area of the historical city is usually criticised because of its functional and spatial neglect. It is also considered unsuitable for the elderly and people with reduced mobility. On the other hand, it is difficult or sometimes impossible to introduce changes to the historical fabric of the city. Hence the need to familiarise users with their space in order to make it work for their benefit. Employing old architecture as a tool for the well-being of users and observers can be an alternative to other undertakings aimed at activating seniors. In this way, spatial forms will again have the potential to serve people [10], although in a slightly

different way. The ordinary nearby area will acquire new meanings. This type of project also creates conditions for increasing or maintaining activity and independence for the longest possible time. It is also part of the senior citizen policy to support aging in one's own locality.

The proposed form of "healing paths" has been applied on a limited scale in forms of alternative therapy conducted by specialists from the Institute of Medical and Sports Rehabilitation in Wrocław in 2018-2021. Since October 2021, the development of a modern form of pro-health psychophysical training with the use of urban space has been carried out by an interdisciplinary team of researchers and students within the PBL project entitled: *URBAN HEALTH PATH. Analysis of opportunities for physical activation of the elderly in urban space with the use of a mobile application.*

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Chapter 2.

ROLE OF SOCIAL SPACES IN THE FACILITIES WITH CARE FUNCTION FOR PEOPLE WITH DEMENTIA SYNDROMS – POSTPANDEMIC PERSPECTIVE

1. INTRODUCTION

The undertaken subject of design works for people with cognitive disorders, on the one hand results from the scale of the problem and the growing number of dementia syndromes, also in the group of people under 60 years of age²², and on the other hand it results from the research-confirmed role of spatial solutions supporting the functioning of patients and improving the quality of patient care. These are mainly studies by Zeisel, Calkins, Day and Carreon, Fleming and Purandare, Day Carreon, Charras, Zeisel, Marquardt [4, 13]. The creation of a dementia-friendly environment is one of the key non-pharmacological interventions. The above research demonstrates that the use of specific spatial solutions (i.a. solutions involving the creation of the control of space boundaries, functional layout, quality of social and private spaces, or aesthetics and interior design) reduces patients' tension as well as supports the working conditions of caregivers. The design guidelines developed so far address this issue mainly in relation to residential buildings [12] and define design principles for urban spaces [2], hospitals and emergency wards [3]. They contain design principles resulting from the specificity of patients' functioning, but they do not always take into account the elements of ergonomics and the principles of universal design. Hence, the concept of creating a tool to check the

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²² According to forecasts, the number of people over 60 with dementia in the group of Western European countries will increase from 4.9 million in 2001 to 9.9 million in 2040, while in the group of Central and Eastern

spatial quality, dedicated to long-term care centers and geriatric wards, adapted to Polish conditions, to help administrative staff in creating spatial solutions of therapeutic importance in the care process of patients. Special emphasis was placed on common spaces used for social activation and forms of occupational therapy, which is of particular importance for maintaining social competences, independence and ensuring that patients have control over their lives. Moreover, in the conditions of pandemic constraints related to the lack of direct contact with loved ones, these spaces acquire a special dimension and significance.

2. METHODOLOGY

The undertaken task was carried out as part of the Project-Based Learning²³, led by academic tutors (A. Szewczenko, I. Benek) with the 1st degree students of Architecture at the Faculty of Architecture of the Silesian University of Technology. The research was carried out in the period from March to June 2021 with the expert support of a psychogeriatrician representing the Research and Development Center at the John Paul II Memorial Geriatric Hospital EMC Silesia Ltd., in Katowice. The following research assumptions were adopted in the conducted research:

- Qualitative research studies of the existing care facilities for people with dementia syndrome, along with the functional and spatial diagnosis of the facilities, help define the optimal assumptions in shaping spatial solutions.
- Consistent with the modern approach in the design of health care facilities and long-term care facilities, appropriate spatial conditions and features of space can ensure the realization of patients' needs and their comfort.
- The basic criterion in designing the space of healthcare facilities is the implementation of the assumptions of the therapeutic environment. With regard to patients with dementia syndromes, this means the creation of an environment that facilitates adaptation and reduces the amount of stress-inducing stimuli.

In the study the following stages of research were adopted:

- Comparative analysis of the assessment criteria of the quality of care facilities,

European countries, divided into areas with lower and higher mortality in the elderly population, the increase will be from 1 to 2.8 million and from 1.8 to 3.2 million, respectively. According to [9]

²³ Project-Based Learning or project-oriented learning consists in replacing a part of the classes with meetings consisting in carrying out specific interdisciplinary projects connected with the idea of Industry 4.0 in small student groups.

which involved the application of tools to check the quality of care facilities for patients with dementia syndrome and for people with disabilities in terms of spatial solutions²⁴;

- Adaptation and verification of the above-mentioned checklists to the conditions in the examined facilities - by analyzing the construction documentation and photo-documentation of the Geriatric Hospital in Katowice and by an on-site inspection at the Alzheimer Center in Warsaw. Due to pandemic restrictions, the on-site inspection was not carried out at the Geriatric Hospital in Katowice. The materials (project documentation, photographic inventory) obtained during the earlier research project conducted by scientific supervisors of the project were applied. Moreover, as part of consultations with an expert in the field of psychogeriatrics, guidelines were obtained from the perspective of patients' functioning in space.
- Development of guidelines for the most significant functions in the above-mentioned facilities. Development of the principles of space shaping in terms of the specificity of patients' functioning as well as with regard to the ergonomics and principles of universal design.

The end result of the work is a checklist adapted to the regulations in force in Poland, together with guidelines for important rooms in the facilities for people with dementia syndromes (Fig. 2.1). This tool allows to conduct qualitative research in institutions for patients, allowing for the principles of universal design. The checklist is a comprehensive tool which also comprises complementary examples of model solutions. They allow us to compare the spatial features of the examined facilities with model solutions, which constitute an additional explanation of the principles contained in the checklist. Among other things, the concepts of common spaces have been developed, which has a therapeutic and activating effect on improving the quality of patients' functioning.

²⁴ Assesment tools to check the quality of care facilities for patients with dementia used in the project: 1. Dementia Services Development Centre (DSDC), University of Stirling: *Dementia design for general hospitals and emergency departments: Audit tool/checklist*, 2. Kate Sheehan: *Wheelchair Guide for Accessible Bathrooms*, 3. *Built for Dementia – Urban Design Analysis Tool*, 4. *Medical-Surgical Patient Room Post Occupancy Evaluation (POE) Tool*, Center for Health Design, 5. *Environmental Checklist – Facility level Checklist*, 6. Checklist for geriatric wards in: Szewczenko A., *Spaces for geriatric care. Shaping the quality of the architecture of geriatric wards*.

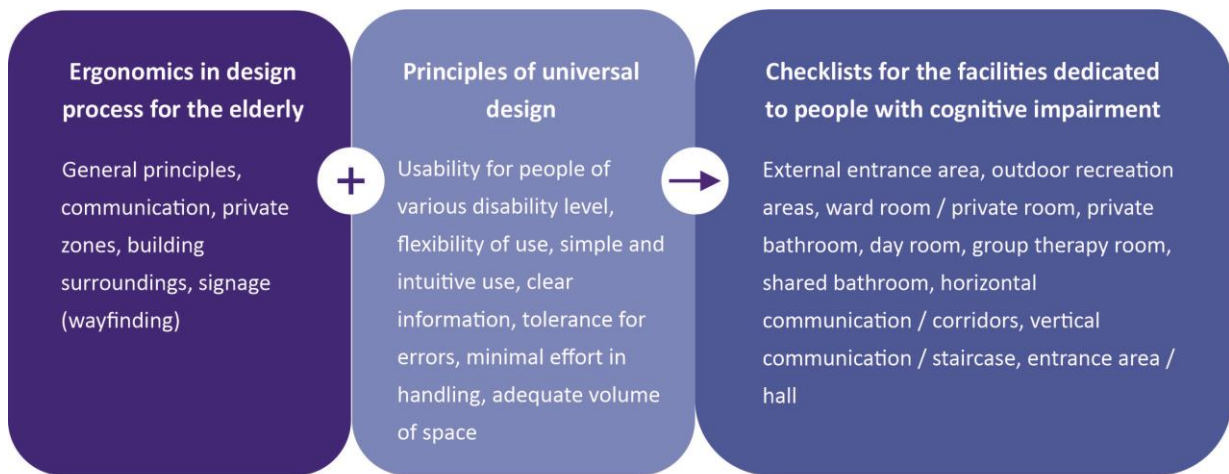


Fig. 2.1. Development process of the checklist for the facilities dedicated to people with cognitive impairment

Source: Prepared by A. Szewczenko

3. CHARACTER OF SPATIAL SOLUTIONS IN ROOMS WITH SOCIAL FUNCTION – RESEARCH RESULTS

Research shows that the mutual influence of the variety of forms of activity and the disparity of spatial features of common spaces affects the level of patients' involvement in social interactions [13]. These are rooms such as: group therapy rooms (with the possibility of passive or active participation in the activities), dining room, day room or multimedia room. Their design process should allow for the principle which ensures that a given space is assigned a character of a place – which has a function clear for the user, containing elements of identification (e.g. a characteristic color of the interior), familiarity, or providing comfort and identity [11]. Their functional layout should allow for the modification of room arrangement and provide a maneuvering area for people in wheelchairs in places where the direction of traffic changes. The location of such rooms should take into account close vicinity of a toilet and the monitoring room for caretakers.

Based on the analysis of the available checklists and reference facilities, guidelines for shaping common spaces have been defined. The developed checklist contains guidelines in the following areas: features of the functional layout and functional relationships of the room, finishing elements of the room, its equipment, colors and lighting as well as decorative elements (see Table 1). The guidelines also take into account the context involving the view from room windows onto greenery or other

non-burdensome surroundings, features of finishing materials of the room (floor, walls, ceiling), including also their colors. The checklist also comprises desirable features of furnishings and decor items (including reminiscent items). An important aspect in defining the criteria listed in the checklist involved ergonomic issues, such as the role of contrasts in the colors of finishing materials in terms of cognitive abilities of patients, or the main features of daylight or artificial lighting. When selecting these features, the emphasis was placed on the reduction of the amount of visual stimuli that are stressful for the patient, and on supporting a sense of security.



Fig. 2.2. Example of corridor solution in a geriatric ward as a social space (Diakonissenkrankenhaus, Dresden); end of the corridor equipped with places to rest and listen to music, sounds of nature

Source: Prepared by A. Szewczenko based on the materials from Diakonissenkrankenhaus, Dresden. Design by G. Marquardt, K. Bütter (courtesy of G. Marquardt, K. Bütter)

Frequently, among the elements of equipment, there are objects relating to the permanent memory resources of patients, which are used as elements of reminiscence therapy (e.g. memorabilia, i.e. old everyday objects such as telephones, newspapers, mugs). Social spaces may also be of a different character - for example, they may be located in the realm of communication to make it more residential, non-institutional and to allow patients to freely observe life in the facility and reduce their sense of isolation (Fig. 2.2).

With respect to social rooms, the checklists were developed for a day room (as the basic social room at the hospital ward) and for a group therapy room (as a multi-functional room at a long-term care facility). The checklists were supplemented with visualizations of the selected interiors, as presented for example in Fig. 2.3 (for a group therapy room).

Table 1

Assessment criteria contained in the checklist for social rooms (day room, group therapy room)

Main elements of the facility	Assessment criteria	Most significant area of impact on the patient
Features of the functional system	Location of the room in the building, functional relations	Creating the atmosphere of the facility - reduction of stress through non-institutional nature of the interior, strengthening of social activities
	Area of the room and functional solutions	Accessibility for people with disabilities, strengthening of independence, autonomy and mobility, maintenance of social contacts
	Relationship with the building's surroundings	Relaxing effect in the contact with non-burdensome environment
	Location and features of the door	Accessibility for people with disabilities, ease of moving around between places
Solutions involving finishing materials	Flooring, walls, ceiling and doors of the room	Stress reduction, improvement of the perception of space, strengthening of stability, ensuring dignity involving the use of space
Microclimate of the room	Day and artificial lighting, its adjustment. Colors of the room and that of equipment elements. Noise reducing elements	Strengthening the sense of security, reducing the level of environmental stress, the ability to decide about oneself, strengthening the autonomy
Decorative elements	Arts elements, decorative greenery, reminiscent elements	Maintaining cognitive functions, reducing stress

Source: Prepared by A. Szewczenko, I. Benek

In effect of the verification of the developed guidelines, the requirements for the equipment of the room in the above-mentioned facilities were specified (e.g. chairs with armrests with color contrasting with the floor, modular tables allowing to change their configuration). An important context of the research involved the limitations in the functioning of hospitals and care facilities resulting from sanitary regimes during the pandemic. The site visits also made it possible to observe changes occurring in common spaces - remote meeting places have appeared, segregation of public and semi-private spaces in care centers is a key role - this allows to control the movement of people visiting the center in terms of epidemiological risks.



Fig. 2.3. View of a group therapy room: place for conducting an activity (in the foreground), seats for passive participants (in the background)

Source: Prepared by W. Grzechnik

According to the collected information, this significantly changed the forms of contacts between patients and their relatives, and hence - a change in the way of using common spaces. In addition, it also had a direct impact on the health of the patients. The experience of care facilities regarding a significant limitation of contacts between the residents (increase in mortality) is an important condition for the verification of the applied solutions, although at the moment there are no in-depth analyses in this respect, and hence it is not possible to formulate any guidelines. Favorable weather conditions allowed for easier contacts with relatives in the immediate vicinity of the building, which was taken advantage of at both tested facilities (Fig. 2.4). Thus, the role of solutions in the external, recreational zones associated with the building increases (e.g. pre-entrance recreational greenery, therapeutic garden, patio).



Fig. 2.4. View of the external spaces of the examined facilities: on the left - recreational area at the Geriatric Hospital in Katowice; on the right - view of the internal patio in the Alzheimer Center in Warsaw

Source: Photo: A. Szewczenko

4. CONCLUSION

The quality of social spaces in geriatric hospitals and long-term care facilities is the result of the implementation of appropriate functional, but also behavioral assumptions that affect their accessibility and transparency for users, who are people with cognitive impairments who require environmental support.

The conducted research, which resulted in the development of the checklist, confirms the complex nature pertaining to the impact of space on the functioning of patients with dementia syndrom. In addition, the experience of nursing facilities regarding the significant degree of reduced contact between the residents themselves and their loved ones (which increased mortality) is an important determinant for the revision of commonly used solutions for the design of rooms with a social role. Comprehensive coverage of design guidelines as part of the checklist can be an effective tool for checking the quality of healthcare and long-term care facilities. The quality of social spaces is frequently overlooked, especially in geriatric wards. It should be emphasized that this has a significant impact on the quality of life of patients and plays an important role in creating conditions for maintaining their social activity. Additionally, the research emphasizes the need to search for effective solutions in external zones and other recreational zones in the realm of limited

contacts between patients and their relatives in the conditions of sanitary restrictions in the pandemic. Therefore, the research and analysis presented on the development of checklists is a must and a necessary component in the design process of such facilities.

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Chapter 3.

USE OF VIRTUAL REALITY IN DIAGNOSIS AND DESIGN FOR OLDER PEOPLE WITH DEMENTIA

1. INTRODUCTION

The problem of cognitive impairment is a growing phenomenon not only among older people. Current demographic forecasts predict an increase in life expectancy and a significant growth in the elderly population, which increases the number of people in the risk group for dementia [1, 12]. In economically developed countries, about 14-15% of the population is already over 65 years of age. It is expected that in 2030 these percentages will be 23% respectively [9, 13]. Therefore, it is estimated that the incidence of dementia will double every year over the coming years [6].

Older people often report reduced spatial skills. The deficits that emerge include spatial disorientation associated with impaired perception of direction and movement of one's own body, memorization of location and route retrieval and difficulties in estimating the distance between two objects [7]. The first stages of Alzheimer's dementia are characterized by episodic memory impairment, but also by topographical disorientation, inability to navigate in a familiar environment, difficulties in learning new routes and recognizing places or using maps for navigation [4, 8, 11]. Therefore, it is important to point out the high diagnostic value of tasks assessing spatial orientation.

Technological development creates the opportunity for a more accurate diagnosis of elderly people in the early stages of dementia and for a better use and archiving of the obtained results enabling correct and early detection of the stages of dementia.

There is a growing emphasis in diagnosis on using neuropsychological assessment

in conditions similar to those in which we use our cognitive functions on a daily basis.

From this point of view, virtual reality seems to be an extremely useful technology for the assessment of cognitive functions, as it allows simulation of real situations. On the other hand, it offers the possibility to test spatial solutions, which are an acknowledged factor that can support the quality of patient care and functioning.

Furthermore, this approach minimises the cost, study time and provides more precise control over stimulus delivery and additional evaluation metrics.

2. ASSUMPTIONS MADE

The main idea of the presented activities was to design a graphic information system for the space occupied by a person with dementia and to test the solution in an application for mobile VR glasses. The application for mobile VR glasses, presenting the world from the perspective of 60+ people, was developed during the interdisciplinary cooperation between the Faculty of Automatic Control, Electronics and Computer Science and the Faculty of Architecture of the Silesian University of Technology. It provides the possibility to test spatial proposals related to design for the elderly in virtual space. It is also possible to run the application with the simulations of diseases of the elderly disabled, so that the application could also be used by the elderly.

The project was carried out by an interdisciplinary team, in which architects applying the principles of universal design and using tools to create digital 3D models created the tested spaces, while IT specialists within the framework of creating 3D applications for VR devices, applied graphical algorithms and solved optimisation problems. The main focus was on testing cognitive functions such as spatial orientation and executive functions. When designing, special attention was paid to ease of use and the choice of tasks that 60+ people face on a daily basis (e.g. finding your way to the doctor's office, using a seat, finding a toilet). HTC Vive Pro Eye goggles were used, complete with VR controllers and eye-tracking cameras, which made it possible for the virtual world to be presented in photo-realistic quality, to navigate the virtual world and to interact with virtual objects.

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The project analyzed the requirements and limitations of people with dementia as well as the method of designing graphic information, which is an important part of properly shaping the space in which people with dementia reside.

The project benefited from the assistance of an external expert: a psychogerontologist practising at the Geriatric Hospital in Katowice, who introduced the students to the diseases of old age, the needs and limitations of people 60+, and methods of neuropsychological diagnostics of people 60+.

3. IMPLEMENTATION METHODS USED

The research made it possible to organize and structure the materials concerning the principles of designing a graphic information system for people with dementia and tested mobile VR glasses for simulating the medical problems of older people in private and public spaces.

Various graphic techniques supporting the orientation of an elderly person with dementia and methods for testing them in virtual space on mobile devices were also analysed.

The study used the results of work carried out at the faculties of the Silesian University of Technology: Architecture and the Faculty of Automatic Control, Electronics and Computer Science, including the tools for simulating the medical conditions typical of people 60+ and tools for diagnosing people 60+ made for VR glasses, requiring computers with high computing power to operate. Architectural designs and digital models were also available.

External experts were consulted: a psychogerontologist from the Geriatric Hospital in Katowice - Mr. Adam Bednorz, therapists from the Alzheimer's Centre in Warsaw.

As a result of the project, an application for VR glasses was created to allow the user to perform daily activities in a modelled senior flat and to find their way in the corridor space of a medical care facility. The perception of space in the app can be limited by the inclusion of simulations of vision problems common in old age. Moving around in the modelled world can also be performed in a wheelchair.

The following scientific and research problems were solved during the project:

A) Diagnosis of the needs of people with dementia - defining a user profile (literature research, consultation with experts)

The research section focuses on elderly persons with dementia and analyses their ergonomic requirements, health-related needs, and psychological needs. The following assumptions were made in the study:

- suitable spatial conditions are a significant factor supporting the elderly patient in his current functional competence,
- the individual elements in the environment of the older dependent person should strengthen him or her in their existing functional competences including his or her activity and mobility, independence and autonomy,
- an essential criterion in the design of the space surrounding an older person is the reduction of stress achieved by maintaining an appropriate level of control over the environment.

Designing a built environment for older people requires a detailed and thorough approach, taking into account the possibility of adapting it on an ongoing basis to the changing abilities and needs of older people. It is also necessary to take into account the motor, auditory, visual and mental impairments that are common among older people including the use of crutches.

B) Improving the functioning of the analysed VR spaces for people with dementia, who are their main users

An important issue was to investigate the architectural techniques and facilities that support older people with vision and mobility problems (using a wheelchair) in order to improve the modelled spaces.

To start with, functional requirements were specified related to the needs of the elderly and the accessibility postulate in connection with the fact that it was assumed that the user of the designed interiors will be a person moving in a wheelchair, which poses the largest number of spatial requirements. The designed interiors should enable the elderly person to maintain mobility, create conditions for independence and support self-orientation. The proposed features of the designed spaces are listed below.

- there should be adequate manoeuvring space in the designed interior,
- access to all rooms, furniture, equipment, etc. should be provided,
- presence of solutions that increase the comfort of using the space (e.g. handles, elderly-friendly furniture),
- providing adequate lighting. Good lighting helps with orientation and enhances older people's sense of security. Poor lighting increases anxiety, makes the

environment less legible and increases the risk of falls. The functionality of a room can be changed with the help of lighting. Setting the right light intensity and colour can have a relaxing effect on the mood of the older person (light therapy),

- appropriate choice of materials and colours of objects - it is important to contrast the form against a given background.

The main objective was to provide access to information in the designed space. Therefore, when modelling the interiors, particular attention was paid to the colour scheme. In terms of environmental accessibility, the colour of rooms and furnishings plays one of the main roles, as it is an important stimulus that plays a role in the perception of space, including informing about the spatial layout of rooms. Colour coding is one of the factors that supports orientation in space, which reinforces the sense of control that is extremely important for the functioning of older people. It is also a factor influencing well-being.

The following design guidelines have been adopted [10]:

- colour gives guidance, direction – supports safe movement, finding objects,
- older people may have difficulty distinguishing colours. They need three times as much light to see clearly. Therefore, the use of contrasting colours is recommended (wall-to-floor, tablecloth-to-table, armchair-to-carpet, washbasin-to-wall, for example),
- use pastel, warm colours - which are not tiring to the eye and are easier for older people to recognise than cold tones,
- avoid patterns, especially on walls and floors, as excessive visual stimulation can cause disorientation and therefore fear in older people,
- avoid combining blue and green, as older people have difficulty distinguishing between these colours.

Colour contrast of adjacent surfaces is also 'key' to vision, especially for older people with symptoms of dementia. The aim should be to increase contrast in the visual field. This can be achieved in particular by using appropriate interior design materials. It is recommended that important signs carrying information be highlighted with contrast and the used sockets and light switches should contrast with their background. Due to the fear of falling, which is very common among older people, changes in level should also be emphasised with contrast (e.g. the use of tapes to mark the edges of steps, the use of contrasting handrails or the use of contrasting chair covers in relation to the floor surface).



Fig. 3.1. Interior of an apartment – daytime part
Source: Own study

The designed interiors were modelled and then tested using the VR application. The architects had the opportunity to test the proposed changes. The accessibility of the proposed space was tested. The tests provided the opportunity to see the errors that may go unnoticed in the classic presentation of interior design: e.g. an incorrect way of opening doors due to the location of the handle, or uncomfortable use of equipment in the kitchen or bathroom.

The most important element of the proposed VR interior presentation is the possibility to perceive the space using filters that simulate visual dysfunctions. This instrument makes it possible to correct inappropriate colour combinations and to apply appropriate solutions for the particular dysfunction.

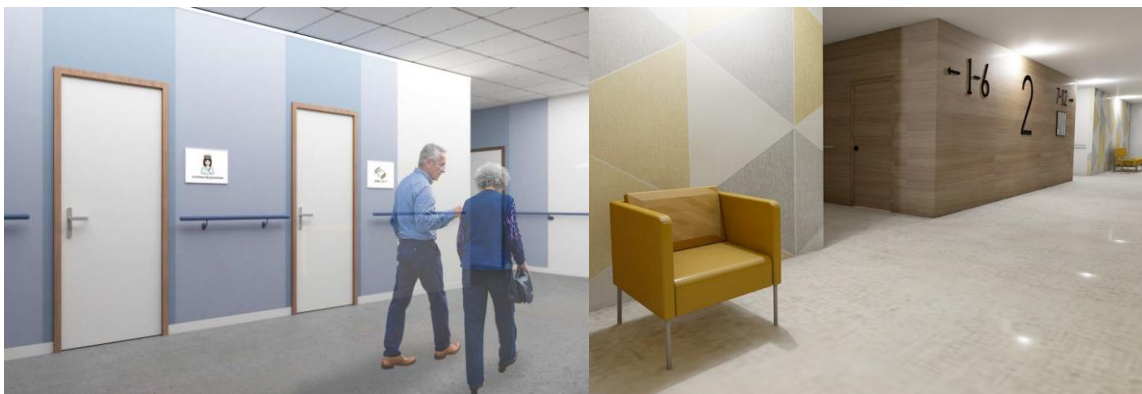


Fig. 3.2. Part of a corridor in a medical care facility
Source: Own study

C) Designing a graphic information system for people with dementia

One of the elements that determine the quality of interiors in terms of user comfort is the introduction of elements that facilitate independent orientation and movement in space. From the point of view of comfort for the elderly person, this is a response to the need for independence in reaching the desired destination, the need for locomotion and a sense of security. The older person finds it easier to move around in a space where the wayfinding system is understandable and legible. Such a system also facilitates the work of the staff.

What supports the users is not only the visual identification system of the facility with graphic marking of points in space, but also other architectural elements of the facility, which facilitate orientation and finding the way to the destination. The basic elements of the system are:

- general layout of communication routes,
- characteristic elements of the surroundings of the building, visible from the inside, in particular from communication routes,
- the complexity of the body of the building and its clarity in the entrance area,
- composition and colour scheme of the interior,
- visual identification system - signage, graphics,
- accompanying services, e.g. information points.

One group of users with impaired spatial orientation are people with cognitive dysfunctions who may exhibit non-normative behaviour in a space with an excessive number of stimuli. Medical experiments indicate that the feeling of being lost in time and space, the lack of conditions for undertaking meaningful activities and the loss of independence in these people exacerbates the condition. Designing the elements of the wayfinding system to meet the needs of elderly people should take into account the limitations resulting from their various dysfunctions.

The following are the basic guidelines to facilitate movement and wayfinding in a facility that have been adopted in the design:

- placing directional signage at all nodal points (e.g. in places where communication paths cross inside the building) and signage in logical points – where the moment of choosing further route occurs, changing the direction of movement, differentiating the colour of floors,

- the introduction of handrails along walkways at the height of 90 cm, in a colour different from that of walls and floors for the comfort of the visually impaired; this rule also applies to the use of contrasting colours for walls and floors,
- designing a visual identification system (signs, pictograms) that takes into account cognitive limitations of the elderly person; this mainly applies to the simplicity of the communication paths system, the colour scheme of the rooms, which can be consistent with the signage system. These solutions should be supported by using linear directional elements or linear lighting to guide people to specific locations,
- information banners located in characteristic places of the building, at the entrance, in communication nodes, characteristic points of the building (entrance area, garden, dining room, day room, chapel, living area),
- the general plan of the building - in the reception area or at a junction, indicating the "you are here" point,
- information boards, i.e. information on how to move around the building (showing the direction of movement), information on the function of a particular room, the resident's name on the room door,
- daily plan - posted, for example, on each residential floor, near the dining room or in the main hall,
- clock, calendar - very important elements, especially for persons with dementia, who lose their orientation. The proposed locations for these elements are the reception, the main hall, the dining room, the day room, the workshop room and the residents' rooms.



Fig. 3.3. Examples of pictograms used in the design of a flat - monochromatic version

Source: Own study

General guidelines for the design of communication spaces taking into account the dysfunctions of people with dementia include:

- facilitating orientation in space by means of design elements such as pictograms or photographs placed in areas that the patient should associate with a particular function,
- enhanced sense of security in terms of locomotion (safety of floors, handrails, etc.), good visibility of circulation routes, no glare due to different light intensity between rooms or reflective flooring,



Fig. 3.4. An example of an interior of a flat: the kitchen – supplemented with a graphic information system

Source: Own study

- avoiding contrasting floor compositions layouts along walkways (this can be interpreted as a change in floor level),
- limiting visual and auditory stimuli, e.g. very bright and over-stimulating colours, the use of sound-absorbing floors,
- enabling movement at particularly stressful times (wandering around the room), access to a walking area with recreational greenery.

Based on these guidelines, a visual information system for people with dementia was developed in a virtual, modelled space.

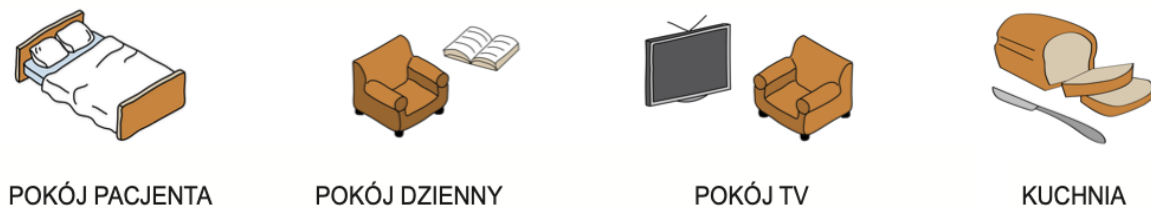


Fig. 3.5. Examples of pictograms used in the design of a flat – colour version

Source: Own study

D) Testing the VR application for mobile devices

When designing the interaction, it was taken into account that it must be possible for the application to be operated by elderly people. Therefore, the focus was on the simplicity of the interface and ease of use.

The IT group solved problems related to the configuration of the application, navigating in the virtual environment and marking virtual items.

The user has a choice of two methods to select the configuration of the application (Fig. 3.7) - the so-called quick start, where the selection of the configuration is based on a hand gesture (e.g. clenching the hand), or selection with a controller on the interface hooked within the user's visual field. Pressing the trigger button on the controller or pressing the index finger against the thumb confirms the selection.

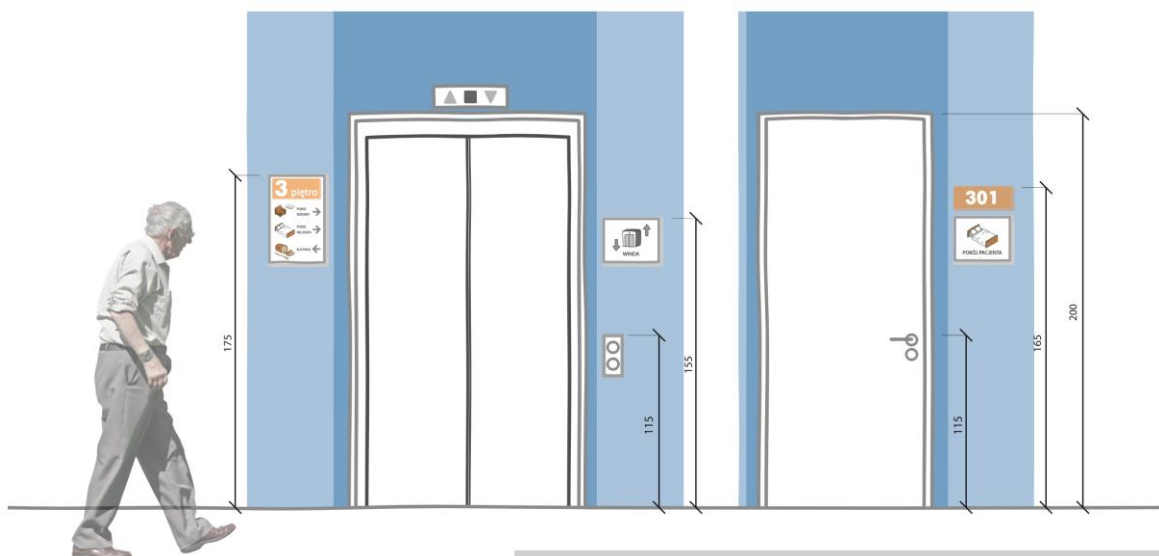


Fig. 3.6. Example of a public interior: lift entrance and room – supplemented with a graphic information system

Source: Own study

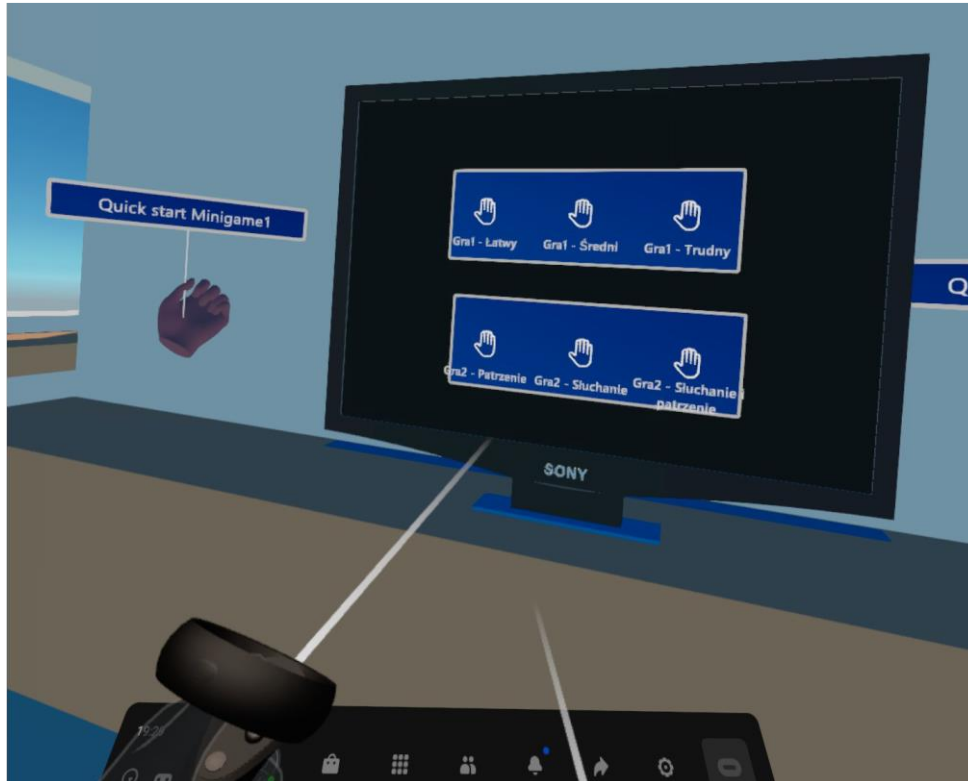


Figure 3.7. The configuration of the application – task selection
Source: Own study

The user also has a choice of methods for moving around in the virtual space. Two systems of movement have been designed, which one can switch between when starting the programme: walking (performed while standing up) or moving around in a wheelchair.

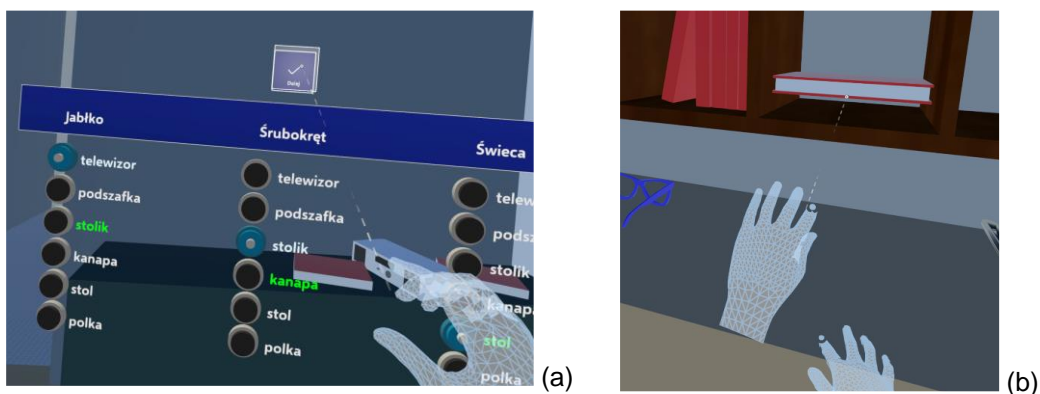


Figure 3.8. Choice of an answer (a) or an object (b)
Source: Own study

The user of the application, in addition to moving in virtual space, can perform certain set tasks that diagnose the users' cognitive functions. As part of the tasks performed, the user interacts with virtual objects using VR controllers:

- selecting options on the interface hooked in the user's visual field (Fig. 10a). When a selection has been made and approved ('Next' button), the correct answer is highlighted in green,
- marking virtual objects by releasing a beam from the controller or hand (Fig. 8) and confirming it by pressing fingers together or using a button. When the cursor is hovered over an object, its name is read.

The project also makes it possible to simulate certain medical conditions:

- Cataract (Fig. 3.9a) is a genetically conditioned or acquired condition leading to the clouding of the lens of the eye. The appearance of cataract is mostly related to the ageing process. Diseases such as diabetes, various types of trauma or eye surgery can also cause progressive development of this disease;
- Glaucoma (Fig. 3.9b) is a group of ophthalmological disorders causing progressive long-term damage of the eyes, which leads to the deterioration or complete loss of vision. The main element leading to this disease is the increase of pressure inside the eyeball. A person suffering from glaucoma experiences a vignette effect which distorts the visible image;
- Yellowing of the eyes (Fig. 3.9c) is one of the many effects of eye ageing. At the age of 40, the inside of the lens of the eye begins to change its colour from colorless to yellow. As we age, this colour change becomes more pronounced. Progressive changes modify the scattering of light by the lens of the eye. As a result of these processes, a yellow filter is formed.

The simulation of a visual dysfunction in the described system consists in the modification of the image displayed on the screen of the device. To modify the image, image processing effects called postprocessing effects were used. These are effects which modify the image after it has been generated by the graphics card of the device.

The application testing process made use of the tools provided by the Unity environment and the RenderDoc program. For relatively accurate results, data was taken from the built application running on Oculus Quest VR glasses.

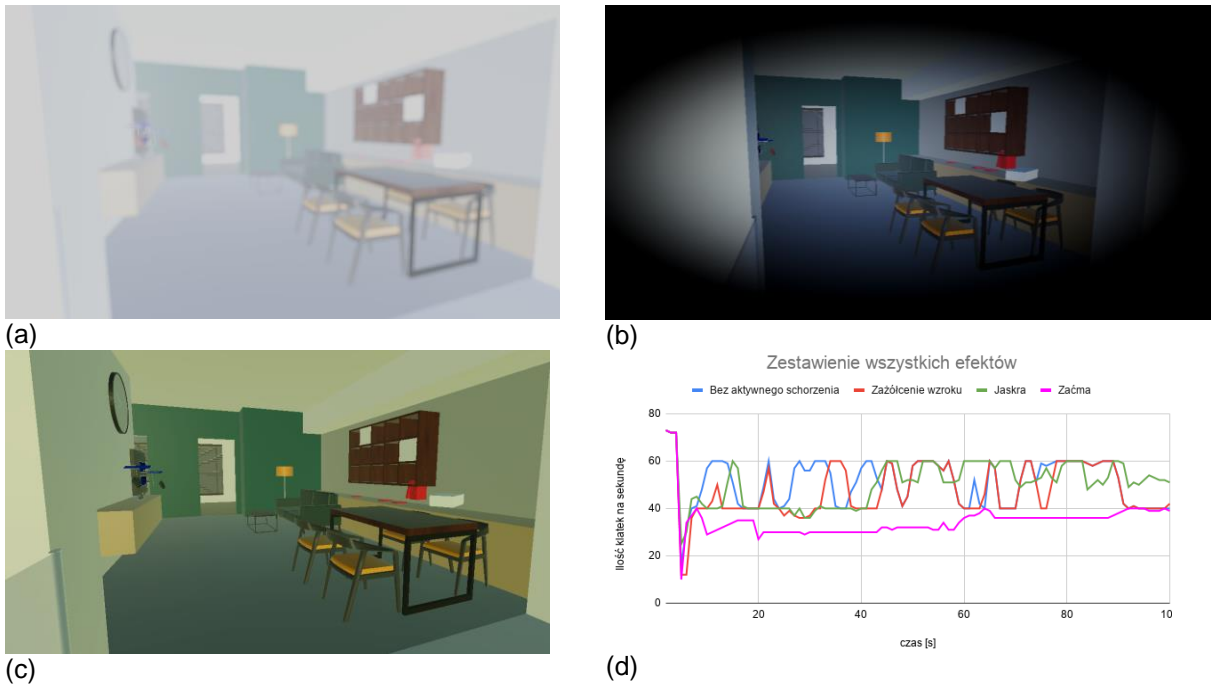


Fig. 3.9. Simulation of cataract effect (a), glaucoma (b), image yellowing (c). Summary graphs of the number of frames per second for each simulation (d)

Source: Own study

When creating the VR application it was important to develop several versions, differing in functional and formal solutions, the number of stimuli (objects, details, colours) and then to assess the relationship with the results obtained by the patient. Due to the possibility of using the developed VR tasks to diagnose cognitive deficits occurring in other age groups than the elderly, the possibility of adjusting task parameters was provided in the diagnostic panel. The creation of VR applications useful in neuropsychological diagnosis makes it possible to introduce additional parameters important in the process of remembering stimuli by controlling the amount of information in a given experimental task. In research using VR, the so-called *level of detail (LOD)* – that is, the amount of information (stimuli, objects) occurring in a given modelled VR space, is increasingly often indicated as an additional variable.

4. RESULTS ACHIEVED

The final result of the research and implementation work is an application designed for mobile VR glasses simulating the perception of the world from the perspective of a person 60+ and testing the neuropsychological skills of people 60+.

Guidelines have been developed for the labelling of rooms and furnishings for people with dementia. Signs and labels have also been designed as part of a graphic information system in spaces dedicated to people with dementia.

Designed as part of the collaboration between the Faculty of Automatic Control, Electronics and Computer Science and the Faculty of Architecture of the Silesian University of Technology, the application provides an opportunity to test design proposals. The application for mobile VR glasses, simulates the representation of the world from the perspective of an elderly person (e.g. with cataract) while performing simple everyday tasks. It applies the designed signs in the modelled space and analyses the colours, contrasts or font sizes used.

The final results of the project are design proposals for the signage of rooms for people with dementia, along with guidelines and an application for mobile VR glasses that makes it possible to test the signage in the private space of a flat and in public space – a corridor in a health centre.

The created tool can be used, among other things, to increase the sensitivity of people (with a particular focus on architects and decision makers) to the needs of older people. The proposed VR tool allows its use also by older people during cognitive function diagnosis.

The work also resulted in developing the designs of two interiors (a flat and a corridor in a medical facility) developed in accordance with the requirements of universal design.

An additional result of the project are digital models that can be used in other projects in the future.

Yet another result are the developed guidelines concerned with:

- designing virtual spaces for mobile devices,
- optimising VR applications for mobile devices,
- interaction with the virtual environment for mobile VR glasses.

An important aspect of the entire project was the interdisciplinary collaboration between the Faculty of Automatic Control, Electronics and Computer Science and the Faculty of Architecture. Each party brought specific skills and experience into the project, as well as their unique perspective and the ability to carry it out. The architects responsible for designing the virtual spaces had to take into account the computer scientists' requirements for optimising the models. Architects had to overcome their habits, which include modelling even the smallest details without

worrying about their complexity. This is unacceptable for a VR application where rendering takes place in real time. The computer scientists, on the other hand, had to increase their sensitivity to space planning and the placement of objects in virtual space.

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nt life experience. The seniors of the future will have different skills and competencies as well as expectations than the current generation of the elderly. Moreover, they will represent a larger share in the society when they get old.

Jan WRANA²⁶, Marcin ĆWIK²⁷

Chapter 4.

DEVELOPMENT OF A HEALTH RESORT TO ACCOMMODATE FOR NEW TRENDS IN HOUSING ARRANGEMENTS FOR ELDERLY PEOPLE

1. INTRODUCTION

The process of society ageing is observed in all European countries, and current demographic forecasts confirm that this to be a growing tendency also in Poland. A parallel shift of sociological models of social life also takes place in Poland – from living in family communities to living in a generational community²⁸. At the same time, the percentage of elderly who do not want to conform to the “dictatorship of the young” is growing, and they find fulfillment at a later age.

The generational transformation is currently not reflected in the functioning residential structures, as most of the organised residential forms of the elderly is based on a carer model, assuming *a priori* the lack of independence (helplessness) and bad health condition of the elderly, therefore, when the time of living transforms into just clinging to life.

The idea of creating and implementing a space design system dedicated to the elderly is to extend the phase of autonomous and active life, as a natural life cycle, with the consideration of the needs resulting from age.

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²⁸ Estimation of emigration from Poland for temporary stay in 2004-2020: <https://stat.gov.pl/obszary-tematyczne/ludnosc/migracje-zagraniczne-ludnosci/informacja-o-rozmiarach-i-kierunkach-czasowej-emigracji-z-polski-w-latach-2004-2020,2,14.html>

2. RESIDENTIAL FORM MODELLING – UNIVERSAL DESIGN

2.1. Base Assumptions of a Design Process

Designing highly complicated and difficult environments such as hospitals, retirement homes, long-term care homes or sanatoria, is more and more often preceded by pre-design research studies in order to base the designing process on solid evidential grounds. They mainly serve the purpose to properly carry out the process of functional and spatial designing [3], which should be focused on the needs of a constantly growing group of seniors in European societies. The above considerations imply a *sine qua non* condition for the creation of new space for long-term care, i.e. the use of the most recent research within the scope of universal designing. A logical result in the context of progressive aging of the society is the recognition of universal designing as a necessary element in the strategy of actions responding to the above challenges. In accordance with global trends in designing facilities mainly dedicated to elderly people, therapeutic and supporting influence of space begins to play a larger role in the design of architectural solutions [4]. Mid-1980s saw the beginning of an approach in design that was aimed at ensuring a possibility to use public space for people with restricted functional capabilities.

2.2. Targeted Guidelines in Universal Design

Undoubtedly those efforts contributed in the following years to development of a trend the purpose of which was, and still is, to introduce functional solutions conducive to elderly people – the largest group of users with diverse disfunctions. The conducted research enabled to develop guidelines supporting the education process of designers and users, resulting in designing principles such as: usefulness for people with various abilities; simple and intuitive use; flexibility in use; legible information; tolerance to errors; comfortable, effortless use, and size and space appropriate for access and use [12]. The above guidelines and general principles are broadly applied in the process of designing public space of hospitals (including long-term care facilities), within the external and internal communication [4].

Research [2] has shown that for elderly people it is beneficial to stay in independent residential space, with access to animated and differentiated public space. Therefore, we should strive to ensure as long as possible the independence from assistance of third persons and residential forms facilitating everyday life to

patients staying in spa facilities in health resorts or in long-term care facilities. An important dimension of universal designing and accessibility of a hospital facility (including long-term care facilities) is to provide solutions that assure safety and independence to users [2].

Architecture and proven functional solutions may contribute to this by introducing qualitative solutions that will affect spa patients in a therapeutic way, including also the fulfilment of their psychological, emotional and aesthetic needs [4], at the same time maintaining separateness of intimate zones for seniors, which in terms of the impact of spatial environment of long-term care facilities results from the optimal sensory, movement and social stimulations, enabling people to adapt to environmental conditions [3]. The basic condition for the well-being of residents during their stay in long-term care facilities is personal space ensured in individual residential premises (rooms). The basic tool is to shape solutions that enable to adapt the premises to a degree of residents' independence, because it has been proven [3] that elderly people require more flexible space in terms of arrangement. The most important behavioural criteria include the following needs: privacy, space personalisation, regulation of intensity of social interactions, safety, control of environmental conditions [1].

3. SOCIAL-FUNCTIONAL STRUCTURES FROM THE PERSPECTIVE OF THE DIRECTIONS OF DEVELOPMENT OF RESIDENTIAL FORMS OF THE ELDERLY – SELECTED MODELS

It should be emphasised that the world of the so-called western civilisation has a much more diverse offer of residential forms for the elderly than what is currently available in Poland. The richer societies build complex residential districts for the elderly, allocate dedicated apartments for the elderly in city residential housing or independent apartments in nursing homes with commuting nurses, as well as retirement homes with full services. Also, special houses adjusted to taking care of people with dementia and objects for people requiring constant palliative care are provided [3]. In Poland, the elderly, according to the "long-term" care definition included in the introduction, mostly use the ad hoc care in private apartments, activating sessions in daily care homes, live in nursing homes, including the ones with palliative care, but also go on rehabilitation stays and undergo hospitalisation in health resorts.

3.1. Isolated Structure – Sun City as the Imperfect “Perfect City”

“Sun City” – a district for the elderly in Phoenix, USA, in the form of a gated community, at the level of social-motor activation, offers its inhabitants all types of facilities, diverse housing base, broadly defined social integration objects, including a well-developed sport infrastructure [16].



Fig. 4.1. Sun City, from left: Recreational Center (RCSC); multilevel apartment building condos – one of many the residential housing forms in the district, common spaces – library; hospital (Boswell Memorial Hospital)

Source: [16]

These solutions provide the sense of security, identity and belonging, without neglecting the technical and medical support for the community members. The well-developed infrastructure is favorable to extending physical fitness of the elderly and the autonomous functioning of individuals. The negative side of gated communities, apart from only the design issues, is the closed, isolated community of wealthy people. An open question remains if the history of over 50 years of Sun City is an example of the perfect solution, or the perfection of a solution dedicated to a specific social class and group.

3.2. Expansion of Infrastructure of an Existing Health Resort – Busko-Zdrój

The attractiveness of health resorts is based mainly on the therapeutic values of the natural environment and its elements – in the case of Busko-Zdrój, these are sulfide waters and iodide salines that are unique in the world. The offer of over one hundred therapeutic procedures created around the natural resources assists in rehabilitation and treatment of rheumatological, neurological, orthopaedic-traumatic, cardiac and dermatological conditions [14].



Fig. 4.2. Busko-Zdrój, from left: saline graduation tower in the new health resort park; “Słoneczny Zdrój” hotel entry zone; “Marconi” sanatorium – health resort pool
Source: [14], [15]

The historical hotel and hospital base, due to the growing demand for this type of services related to the growing wealth of the society (the development of “senior tourism”), but mainly to the progressing ageing of the society, is regularly expanded. A positive example with all the attributes of a therapeutic enclave is the “Słoneczny Zdrój” Hotel Medical Spa & Wellness opened in 2013. It has a hotel, wellness, spa and catering infrastructure, and it offers a range of medical and rehabilitation services using the local natural curative waters [15].

All of it makes a coherent health resort with surrounding parks that constitute an additional relaxation zone for guests. The attractive architectural form along with all the functional facilities for the elderly is a good example of universal architecture, which constitutes a response to the social demand. The potential of health resorts is used mostly for temporary stays; transient locations, in which, chasing health, beauty and the passing time, random people can meet.

3.3. Pilot Solutions, Concept for a “New Health Resort” – Zaklików

Since 2016, the collaboration between the Lublin University of Technology represented by SPA WBiA PL and the Zaklików Magistrate has been developing as the University has been working for the regional development. In March 2017, the parties signed documents on collaboration for the creation of a ‘New Health Resort Town’ – the consequence of obtaining the licence to exploit the ‘Lipa Zdrój1’ borehole. Fulfilling the order of the Zaklików Magistrate, two contracts have been concluded, indicating the main designer: *Preparation of the Urban Concept of Land Development for the Planned “A” Zone of Health Resort Protection*²⁹; and *Functional*

²⁹ Concept design team 1A. Concept of the Local Spatial Development Plan of Zone "A" of the "Lipa" Health Resort: main designer - Zone "A" - dr hab. eng. arch. Jan Wrana prof. of PL universities, designer - MSc. arch. Katarzyna Świącicka - Brzozowska, planner - MSc. eng. Ewa Banach, assistants -

Development of a Balneotherapy Unit. Health Care Outpatient Clinic with Therapeutic Baths³⁰.

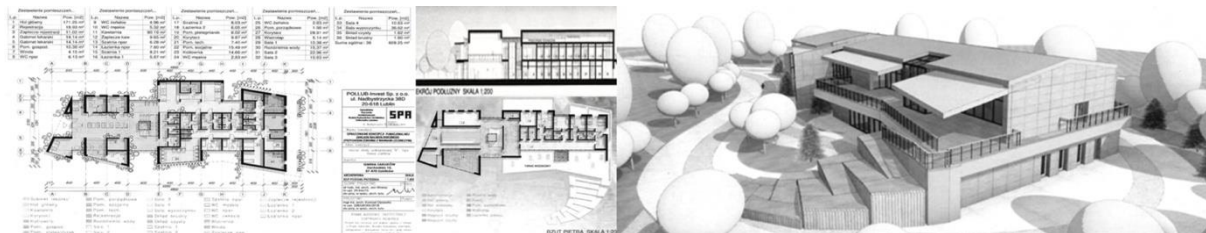


Fig. 4.3. Concept of a “New Health Resort Town,” design of a Balneotherapy Unit – Zaklików, from left: view of the ground floor, longitudinal cross-section, view of the first floor, visualisation
Source: own archive of the main designer, Dr hab. Eng. Arch. Jan Wrana, Assoc. Prof.

The first object planned for development in the preliminary form of organisation of the Health Resort is the balneotherapy unit. The unit will offer their services in the form of an outpatient clinic with therapeutic baths for the inhabitants of the Zaklików municipality, health resort guests, and tourists [7]. The fulfilment of the aforementioned assumptions will increase the dynamics of the development of Zaklików by creating and promoting a new location with great therapeutic potential resulting both from the natural environment and the organized direction of development.

4. DESIGNING AND BUILDING BASED ON THE RES SYSTEM³¹

For several years, we have been observing the implementation of ecologic solutions (allowing the reduction of energy consumption) using sun collectors, windmills or green roof zones and green walls. It is worth to mention about applied heat pumps.

In the article, we propose a change – shifting from traditional systems to newly designed ecologic systems built on the basis of renewable energy sources. The proposed direction is developed in the Architecture Designing Unit, Chair of Modern Architecture in the Division of Construction and Architecture of Lublin University of Technology [8], [9], [10], and the presented low-emission technology of groundwater

Eng. Arch. Magdalena Olszak, MSc. Eng. Arch. Izabella Turkiewicz-Burzak, author of the business model - MSc Jarosław Duda, (Alternative solutions) [7].

³⁰ Concept design team 1B Balneology Department. Health clinic with medicinal baths: chief designer – Dr hab. Eng. Arch. Jan Wrana, Assoc. Prof., designer MSc. eng. arch. Konrad Opasała, 2018.

energy generation will respond to ongoing changes, supplementing new solutions. The presented solution will reduce operating costs by nearly 50% and will allow sustainable development with reduction in CO₂.

5. CONCLUSIONS

To encompass the diversity of phenomena, humans combine them into groups, and they attain order and transparency within them if they divide them into large groups according to the most general categories [13]. In this article, three of the many basic categories conditioning the definition of a universal residential cluster have been proposed, which, in the author's opinion, is a response to the sociological-demographic changes taking place in the modern society. These are: universal design, established development paths of residential units, also in the aspect of local potential, and design based on renewable energy. As the indicated issues do not exhaust the spectrum of research problems to be considered when defining a universal residential cluster for the elderly, the research shall be continued with open research fields in Polish health resorts.

The subject issue should be considered from the apparent syncretic perspective, but in fact there can be no contradiction if there is a clear goal - after all, all roads lead to Rome.

The search for new architectural solutions for the ageing society, taking into consideration the aforementioned conditions, poses a challenge that designers for ensure, also to themselves, the ability of harmonious existence in decent conditions.

From the above analyses and deliberations, it follows that defining a universal residential cluster is an ongoing and open process, and it remains one, as *nulla regula sine exceptione*.

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³¹ RES SYSTEM - Renewable Energy Sources system

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PUBLIC SPACE FOR HEALTH – ALTERNATIVE FORMS OF USE AND CREATIVE DIRECTIONS OF DEVELOPMENT

Abstract

This chapter focuses on highlighting the potential hidden mainly in architectural history and physical culture. This interdisciplinary approach encourages us to look at the space of the historic city as a multidimensional device for psycho-physical exercise. Targeted walking tours in the historic part of the city combined with the activation of the senses, appropriately selected physical movements and an educational form may contribute to improving health, well-being and consequently the quality of life of many user groups. The study presented here may also change the perception of historic architecture and encourage the architectural and design community to reinterpret selected building elements and architectural details.

PRZESTRZEŃ PUBLICZNA DLA ZDROWIA – ALTERNATYWNE FORMY UŻYTKOWANIA I TWÓRCZE KIERUNKI ROZWOJU

Streszczenie

W niniejszym rozdziale skoncentrowano się na podkreśleniu potencjału ukrytego głównie w historii architektury i kultury fizycznej. To interdyscyplinarne podejście zachęca nas do spojrzenia na przestrzeń zabytkowego miasta jako wielowymiarowego urządzenia do ćwiczeń psychofizycznych. Ukierunkowane spacerowanie po zabytkowej części miasta połączone z aktywizacją zmysłów, odpowiednio dobranym ruchem fizycznym i formą edukacyjną mogą przyczynić się do poprawy zdrowia, samopoczucia, a w konsekwencji jakości życia wielu grup użytkowników. Przedstawione badania mogą również zmienić postrzeganie zabytkowej architektury i zachęcić środowisko architektów oraz projektantów do reinterpretacji wybranych elementów budynków i detali architektonicznych.

ROLE OF SOCIAL SPACES IN THE FACILITIES WITH CARE FUNCTION FOR PEOPLE WITH DEMENTIA SYNDROMS - POSTPANDEMIC PERSPECTIVE

Abstract

The objective of the article is to describe the assessment criteria of the quality of social spaces in geriatric hospitals and in long-term care facilities in terms of the needs of patients suffering from dementia syndrom. The presented criteria are part of the developed tool for checking the functional and behavioral quality of the above-mentioned healthcare facilities in terms of the needs of patients with dementia syndrome. The tool was developed together with the students of the Faculty of Architecture of the Silesian University of Technology as part of its participation in the "Excellence Initiative – Research University" program. Discussion on the role of social spaces is of particular importance, especially due to the reduction of such spaces in the functional programs of the facilities and due to the need to implement appropriate solutions to prevent social isolation of patients in the age of pandemic threats. The paper uses a comparative analysis of the available qualitative assessment tools, which allowed for the identification of the most important categories of spatial quality in the above-mentioned facilities.

ROLA PRZESTRZENI SPOŁECZNYCH W OBIEKTACH Z FUNKCJĄ OPIEKI DLA OSÓB Z ZESPOŁEM OTĘPIENNYM – PERSPEKTYWA POSTPANDEMICZNA

Streszczenie

Celem artykułu jest opis kryteriów oceny jakości przestrzeni społecznych w szpitalach geriatrycznych i w placówkach opieki długoterminowej pod kątem potrzeb chorych z zespołem otępiennym. Prezentowane kryteria są częścią opracowanego narzędzia sprawdzającego jakość funkcjonalną i behawioralną ww. obiektów opieki zdrowotnej w aspekcie potrzeb pacjentów z zespołem otępiennym. Narzędzie zostało opracowane wspólnie ze studentami Wydziału Architektury Politechniki Śląskiej w ramach udziału w programie „Inicjatywa Doskonałości – Uczelnia Badawcza” na Politechnice Śląskiej w Gliwicach. Podkreślenie roli przestrzeni społecznych ma szczególne znaczenie zwłaszcza z uwagi na redukowanie tego typu pomieszczeń w programach funkcjonalnych obiektów oraz z uwagi na potrzebę wdrożenia odpowiednich rozwiązań zapobiegających izolacji społecznej pacjentów w dobie zagrożenia pandemicznego. W pracy zastosowano analizę porównawczą dostępnych narzędzi ocen jakościowych, która pozwoliła na wskazanie najistotniejszych kategorii jakości przestrzennych w ww. obiektach.

USE OF VIRTUAL REALITY IN DIAGNOSIS AND DESIGN FOR OLDER PEOPLE WITH DEMENTIA

Abstract

The problem of cognitive disorders is a growing phenomenon not only among the elderly, and spatial solutions are a recognized factor that can support the quality of care for patients and their functioning. The aim of this paper is to present solutions developed in the framework of interdisciplinary cooperation during Individual Study Programs implemented in the form of Project Based Learning (PBL) at the Silesian University of Technology in the year 2021. The main objective of the research was to design a graphic information system for the space where a person with dementia resides and to test the concept in an application for mobile VR glasses. The research helped to organize materials on the principles of designing a graphical information system for people with dementia and to test mobile VR glasses to simulate the conditions of older people in private and public spaces.

INFORMACJA GRAFICZNA W PRZESTRZENI VR DEDYKOWANEJ OSOBOM Z DEMENCJĄ

Streszczenie

Problem zaburzeń poznawczych jest zjawiskiem narastającym nie tylko wśród osób starszych, a rozwiązania przestrzenne są uznanym czynnikiem mogącym wspierać jakość opieki nad pacjentami i ich funkcjonowanie. Celem pracy jest przedstawienie rozwiązań wypracowanych w ramach współpracy interdyscyplinarnej podczas Indywidualnych Programów Studiów realizowanych w formie Project Based Learning (PBL) na Politechnice Śląskiej w roku 2021. Głównym celem badań było zaprojektowanie graficznego systemu informacji dla przestrzeni, w której przebywa osoba z demencją, oraz przetestowanie koncepcji w aplikacji na mobilne okulary VR. Badania pozwoliły na uporządkowanie materiałów dotyczących zasad projektowania graficznego systemu informacyjnego dla osób z demencją oraz przetestowanie mobilnych okularów VR do symulacji warunków przebywania osób starszych w przestrzeni prywatnej i publicznej.

DEVELOPMENT OF A HEALTH RESORT TO ACCOMMODATE FOR NEW TRENDS IN HOUSING ARRANGEMENTS FOR ELDERLY PEOPLE

Abstract

The article touches upon the research problem defined as modelling universal principles for the creation of a residential environment for the elderly. The authors focused on three structural-functional directions, existing and pilot ones, as the baseline for defining a universal residential cluster constituting a response to the sociological-demographic changes. The subject was expanded to include renewable energy as the *sine qua non* of modern design.

ROZWÓJ UZDROWISKA W NOWEJ STRUKTURZE ZAMIESZKANIA OSÓB STARSZYCH

Streszczenie

W artykule podjęto problem badawczy zdefiniowany jako modelowanie uniwersalnych zasad tworzenia środowiska mieszkaniowego dla osób starszych. Autorzy skupili się na trzech kierunkach strukturalno-funkcjonalnych, istniejących i pilotażowych, jako bazowych do zdefiniowania uniwersalnego klastra mieszkaniowego będącego odpowiedzią na zmiany socjologiczno-demograficzne. Temat został poszerzony o energię odnawialną jako warunek *sine qua non* nowoczesnego projektowania.

SPIS RYSUNKÓW

- Rys. 1.1. Wrocław. Kamienica nr 18 („Apteka pod Ratuszem”). Rysunek elewacji frontowej.
- Rys. 1.2. Wrocław. Kamienica nr 18 („Apteka pod Ratuszem”). Zdjęcie elewacji frontowej.
- Rys. 1.3. Dłoń na tle poszczególnych fragmentów fasady.
- Rys. 1.4. Rehabilitant Piotr Bursiewicz wykonujący ćwiczenia inspirowane arkadą, kolumną, rzeźbą.
- Rys. 2.1. Proces opracowania listy kontrolnej dla placówek przeznaczonych dla osób z zaburzeniami funkcji poznawczych.
- Rys. 2.2. Przykład rozwiązania korytarza na oddziale geriatrycznym jako przestrzeni społecznej (Diakonissenkrankhaus, Drezno); zakończenie korytarza wyposażone w miejsca do odpoczynku i słuchania muzyki, odgłosów natury.
- Rys. 2.3. Widok pomieszczenia do terapii grupowej: miejsce do prowadzenia zajęć (na pierwszym planie), miejsca do siedzenia dla uczestników biernych (na drugim planie).
- Rys. 2.4. Widok przestrzeni zewnętrznych badanych obiektów: po lewej – teren rekreacyjny w Szpitalu Geriatrycznym w Katowicach, po prawej – widok na wewnętrzne patio w Centrum Alzheimerera w Warszawie.
- Rys. 3.1. Wnętrze apartamentu – część dzienna.
- Rys. 3.2. Część korytarza w strefie medycznej.
- Rys. 3.3. Przykłady piktogramów wykorzystanych w projekcie mieszkania – wersja monochromatyczna.
- Rys. 3.4. Przykład wnętrza mieszkania: kuchnia wyposażona w system informacji graficznych.
- Rys. 3.5. Przykłady piktogramów wykorzystanych w projekcie mieszkania – wersja w kolorze.

- Rys. 3.6. Przykład wnętrza ogólnodostępnego: wejście do windy i pokoju – wyposażone w system informacji graficznej.
- Rys. 3.7. Konfiguracja aplikacji – wybór zadań.
- Rys. 3.8. Wybór odpowiedzi (a) lub przedmiotu (b).
- Rys. 3.9. Symulacja efektu katarakty (a), jaskry (b), żółtej plamki (c). Wykresy sumaryczne liczby klatek na sekundę dla każdej symulacji (d).
- Rys. 4.1. Sun City, od lewej: Centrum Rekreacyjne (RCSC); wielopoziomowy apartamentowiec typu condos – jedna z wielu form mieszkalnych w dzielnicy, przestrzenie wspólne – biblioteka, szpital (Boswell Memorial Hospital).
- Rys. 4.2. Busko-Zdrój, od lewej: tężnia solankowa w nowym parku zdrojowym; strefa wejściowa do hotelu „Słoneczny Zdrój”; sanatorium „Marconi” – basen uzdrowiskowy
- Rys. 4.3. Koncepcja „Nowego Miasta Uzdrowiskowego”, projekt Zakładu Balneoterapii – Zaklików, od lewej: rzut parteru, przekrój podłużny oraz rzut I piętra, wizualizacja.

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